UNITED STATE DEPARTMENT OF AGRICULTURE
Animal and Plant Health Inspection Service
Wildlife Services

ENVIRONMENTAL ASSESSMENT

BIRD DAMAGE MANAGEMENT IN OHIO

WS Wildlife Services

FINAL ENVIRONMENTAL ASSESSMENT

BIRD DAMAGE MANAGEMENT BY THE OHIO WILDLIFE SERVICES PROGRAM

Prepared by:

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

In Cooperation With:

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE

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ACRONYMS USED IN THE EA

AC	Alpha Chloralose
AI	Avian Influenza
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Surveys
BDM	Bird Damage Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
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 Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FONSI	Finding of No Significant Impact
FY	Fiscal Year
OAC	Ohio Administrative Code
ODA	Ohio Department of Agriculture
ODW	Ohio Division of Wildlife
ORC	Ohio Revised Code
IWDM	Integrated Wildlife Damage Management
INAD	Investigative New Animal Drug
MA	Methyl Anthranilate
MBTA	Migratory Bird Treaty Act
MOU	Memoranda or Memorandum of Understanding
NEPA	National Environmental Policy Act
NHPA	National Historical Preservation Act
NWRC	National Wildlife Research Center
SOP	Standard Operating Procedure
T/E	Threatened and Endangered Species
TGE	Transmissible Gastroenteritis
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U. S. Geological Survey
WS	Wildlife Services

SUMMARY

Wild, domestic or feral birds have many positive values but they can also cause damage to property, agricultural resources, natural resources, and pose risks to human health and safety. This Environmental Assessment (EA) analyzes the potential environmental impacts of alternatives for United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) response to bird damage and conflicts in Ohio. Actions proposed in the EA could be conducted on public and private property in Ohio when the resource owner (property owner) or manager requests assistance, a need for action is confirmed, and agreements specifying the nature and duration of the bird damage management (BDM) activities to be conducted are completed. This analysis is prepared in cooperation with the U.S. Department of the Interior, Fish and Wildlife Service, and the Ohio Department of Natural Resources.

Alternatives examined in the EA include an alternative in which WS does not become involved in BDM and an alternative in which WS is restricted to the use and recommendation of only non-lethal BDM methods (Chapter 3). The third alternative, the preferred alternative, authorizes continuation of an integrated BDM program that includes use of the full range of legal non-lethal and lethal bird damage management techniques (Appendix C). Wildlife Services would use an Integrated Wildlife Damage Management (IWDM) approach including the WS Decision Model to select and apply these techniques, singly or in combination, to meet requester needs to reduce conflicts with birds. Cooperators requesting assistance would be provided with recommendations and information regarding the use of effective non-lethal and lethal techniques. Non-lethal methods recommended and used by WS may include resource management, physical exclusion, relocation, human behavior modification, repellents, reproductive control, frightening devices, and other deterrents. Lethal methods recommended and used by WS may include the use of shooting, toxicants, nest/egg destruction, live capture and transportation to an approved poultry processing facility (birds donated for human consumption) and live capture and euthanasia (Appendix C). All WS activities would continue to be conducted in accordance with applicable State, Federal, and local laws and regulations.

The EA provides a detailed analysis of the impacts of each alternative on target bird populations; non-target species including state and federally-listed threatened and endangered species; public and pet health and safety; and aesthetics.

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with the needs of wildlife which increases the potential for conflicting human/wildlife interactions. This Environmental Assessment (EA) evaluates the potential environmental effects of alternatives for WS involvement in bird damage management (BDM) in Ohio.

Wildlife damage management (WDM) is the science of reducing damage or other problems associated with wildlife, and is recognized as an integral part of wildlife (The Wildlife Society 2010). The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program is the federal agency authorized to protect American resources from damage associated with 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)). Human/wildlife conflict issues are complicated by the wide range of public responses to wildlife and wildlife damage. What may be unacceptable damage to one person may be a normal cost of living with nature to someone else. The relationship in American culture of wildlife values and wildlife damage can be summarized in this way:

Wildlife Services' activities are conducted to prevent or reduce wildlife damage to agricultural, industrial and natural resources, property, livestock, and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, tribes, private organizations, and individuals. The WS program uses an integrated wildlife damage management (IWDM) approach (WS Directive 2.105[1]) in which a combination of methods may be used or recommended to reduce wildlife damage. These methods may include non-lethal techniques like alteration of cultural practices, habitat management, repellents, frightening devices, and physical exclusion to prevent or reduce damage. The reduction of wildlife damage may also require removal of individual animals and/or reducing the local animal populations through lethal means. In some instances, the goal may be to eradicate an invasive species. Program activities are not based on punishing offending animals but are conducted to reduce damage and risks to human and livestock health and safety, and are used as part of the WS Decision Model (Slate et al. 1992).

Wildlife Services is a cooperatively funded, service-oriented program that receives requests for assistance with wildlife damage management from private and public entities, including tribes and other governmental agencies. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently in accordance with applicable federal, state, and local laws and Memoranda of Understanding (MOUs) between WS and other agencies.
Wildlife Services chose to prepare this EA to facilitate planning, interagency coordination and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed damage management program.

[1]The WS Policy Manual (http://www.aphis.usda.gov/wildlifedamage) provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. Wildlife Services Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

1.2 PURPOSE OF THE EA

The purpose of this EA is to evaluate the potential impacts on the human environment from alternatives for WS' involvement in the protection of agricultural resources, natural resources, property, livestock, and public health and safety from damage and risks associated with birds in Ohio. Under the Proposed Action, bird damage management (BDM) could be conducted on private, federal, state, tribal, county, and municipal lands in Ohio upon request.

Several bird species have potential to be the subject of WS BDM activities in Ohio. Bird species addressed in this EA include:

Blackbirds: American crow (*Corvus brachyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), rusty blackbird (*Euphagus carolinus*), common grackle (*Quiscalus quiscula*), European starling (starlings) (*Sturnus vulgaris)*.

Waterfowl and Duck-like Birds: tundra swan (*Cygnus columbianus*), mute swan (*Cygnus olor*), Canada goose (*Branta canadensis*), Atlantic brant (*Branta bernicla*), mallard (domestic/wild) (*Anas platyrhynchos*), American black duck (*Anas rubripes*), gadwall (*Anas strepera*), Northern pintail (*Anas acuta*), American wigeon (*Anas americana*), wood duck (*Aix sponsa*), blue-winged teal (*Anas discors*), green-winged teal (*Anas crecca*), Northern shoveler (*Anas clypeata*), canvasback (*Aythya valisineria*), redhead (*Aythya americana*), ring-necked duck (*Aythya collaris*), lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), common goldeneye (*Bucephala clangula*), bufflehead (*Bucephala albeola*), ruddy duck (*Oxuyra jamaicensis*), hooded merganser (*Lophodytes cucullatus*), red-breasted merganser (*Mergus serrator*), other ducks (Anatanae), American coot (*Fulica americanan*), and pied-billed grebe (*Podilymbus, podiceps*).

Gulls, Wading & Shore Birds: herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), Bonaparte's gull (*Larus Philadelphia*), other gulls (Larinae), common tern (*Sterna hirundo*), Caspian tern (*Sterna caspia*) other terns (Sterninae), great blue heron (*Ardea herodias*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), great egret (*Ardea alba*), cattle egret (*Bubulbus iris*), little blue heron (*Egretta caerulea,*), killdeer (*Charadrius vociferous*), semi-palmated plover (*Charadrius semipalmatus*), piping plover (*Charadrius melodus*), black-bellied plover (*Pluvialis squatarola*), least sandpiper (*Calidris minutilla*), semi-palmated sandpiper (*Calidris pusilla*), upland sandpiper *(Bartramia longicaude*), common snipe (*Gallinago gallinago*), lesser yellowlegs (*Tringa flavipes*), whimbrel (*Numenius phaeopus*), willet (*Catoptrophorus semipalmatus*), American avocet (*Recurirostra americana*), least bittern (*Ixobrychus exilis*), short-billed dowicher (*Limnodromus griseus*), dunlin (*Calidris alpina*).

Birds of Prey and Vultures: American kestrel (*Falco sparverius*), peregrine falcon, (*Falco pergrinus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), Northern harrier (*Circus cyaneus*), bald eagle (*Haliaeetus leucocephalus*), great horned owl (*Bubo virginianus*), short-eared owl (*Asio flammeus*), Eastern screech owl (*Otus asio*), barn owl (*Tyto alba*), snowy owl, (*Nyctea scandiaca*), osprey (*Pandion haliaetus*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*).
Swallows/Swifts: barn swallow (*Hirundo rustica*), tree swallow (*Tachycineta bicolor*), chimney swift (*Chaetura pelagica*), other swallows (Hirundinidae).

Passerines & Others: horned lark (*Eremophila alpestris*), blue jay (*Cyabicutta crustata*), northern cardinal (*Cardinalis cardinalis*), American robin (*Turdus migratorius*), American goldfinch (*Carduelis tristis*), snow bunting (*Plectrophenax nivalis*), house sparrow (*Passer domesticus*), rock pigeon (*Columba*

livia), mourning dove (*Zenaida macroura*), wild turkey (*Meleagris gallopavo*), belted kingfisher (*Ceryle alcyon*), and feral, domestic and exotic birds.

This EA will assist in determining if the proposed management of bird damage could have a significant impact on the human environment based on previous activities conducted and based on the anticipation of receiving additional requests for assistance. Because the goals of WS, the USFWS are to conduct a coordinated program in accordance with plans and objectives developed to reduce damage, and because those goals and objectives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur. Thus, this EA anticipates those additional efforts and the analyses are intended to apply to actions that may occur in any locale and at any time within Ohio as part of a coordinated program.

This EA will evaluate the need for action to manage damage associated with birds in the state, the potential issues associated with bird damage management, and the environmental consequences of conducting different alternatives to address the need for action and the identified issues. The issues and alternatives associated with bird damage management were initially developed by WS in consultation with the USFWS and the Ohio Department of Natural Resources, Division of Wildlife (ODW). To assist with the identification of additional issues and alternatives to managing damage associated with birds in Ohio; this EA will be made available to the public for review and comment prior to the issuance of a Decision[2].

1.3 THE NEED FOR ACTION

Some species of wildlife have adapted to and have thrived in human altered habitats. Those species, in particular, are often responsible for the majority of conflicts between humans and wildlife that lead to requests for assistance to reduce damage to resources and to reduce threats to human safety.

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

The alleviation of damage or other problems caused by or related to the behavior of wildlife is termed wildlife damage management and is recognized as an integral component of wildlife management (The Wildlife Society 2010). The imminent threat of damage or loss of resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources. Those species have no intent to do harm. They utilize habitats (e.g., reproduce, walk, forage) where they can find a niche. If their activities result in lost economic value of resources or

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

threaten human safety, people characterize this as damage. When damage exceeds or threatens to exceed an economic threshold and/or poses a threat to human safety, people often seek assistance. The threshold triggering a request for assistance is often unique to the individual person requesting assistance and can be based on many factors (e.g., economic, social, aesthetics). Therefore, how damage is defined is often unique to the individual person and damage occurring to one individual may not be considered damage by another individual. However, the use of the term "*damage*" is consistently used to describe situations where the individual person has determined the losses associated with wildlife is actual damage requiring assistance (i.e., has reached an individual threshold). The term "*damage*" is most often defined as economic losses to resources or threats to human safety, but the term "*damage*" could also include a loss in aesthetic value and other situations where the actions of wildlife are no longer tolerable to an individual person.

Wildlife management is often based on balancing wildlife populations and human perceptions, in a struggle to preserve rare species, regulate species populations, oversee consumptive uses of wildlife, and conserve the environment that provides habitat for wildlife resources. Increasingly, cities, towns, parks, airports, and private properties have become sites of some of the greatest challenges for wildlife management (Adams et al. 2006). When the presence of a prolific, adaptable species is combined with human expansion, land management conflicts often develop. Birds are generally regarded as providing ecological, educational, economic, recreational, and aesthetic benefits (Decker and Goff 1987), and there is enjoyment in knowing wildlife exists and contributes to natural ecosystems (Decker et al. 2001).

Birds add an aesthetic component to the environment, provide opportunities for recreational hunting, and like all wildlife, provide people with valued close contact with nature. Many people, even those people experiencing damage, consider those species of birds addressed in this EA to be a charismatic and valuable component of their environment; however, tolerance differs among individuals. Because of their prolific nature, site tenacity, longevity, size, and tolerance of human activity, many bird species are often associated with situations where damage or threats can occur. For example, free-ranging waterfowl are extremely adaptable and may use the resources provided by humans in urban landscapes for nesting, raising young, molting, feeding, and loafing.

Birds are difficult to manage because they are highly mobile, able to exploit a variety of habitat types within a given area, and cannot be permanently excluded from large areas. It is rarely desirable or possible to remove or disperse all problem birds from an area, but with a proper management scheme, the number of birds and associated problems may be reduced to a level that can be tolerated. Additionally, management of bird-related problems often exceeds the capabilities of individual people to reduce damage to tolerable levels. In Ohio, problem situations associated with birds typically involve, but are not limited to, unacceptable accumulations of feces in public-use areas, damage to agricultural and natural resources, and unacceptable safety hazards (e.g., aircraft striking birds). Those problems frequently occur on private properties, in residential communities, apartment/condominium complexes, municipal parks, schools, hospitals, natural/habitat restoration sites, corporate and industrial sites, office complexes, roadways, airports, and other areas.

The need for action to manage damage and threats associated with birds in Ohio arises from requests for assistance[3] received by WS and the USFWS to reduce and prevent damage associated with birds from occurring to four major categories (USDA 2003a, USFWS 2003a, USFWS 2009). Those four major categories include agricultural resources, natural resources, property, and threats to human safety. Wildlife Services and the USFWS have identified those bird species most likely to be responsible for

[3]Wildlife Services only conducts bird damage management after receiving a request for assistance. Before initiating bird damage activities, a Memorandum of Understanding, cooperative service agreement, or other comparable document must be signed between WS and the cooperating entity, which lists all the methods the property owner or manager will allow to be used on property they own and/or manage.

causing damage to those four categories based on previous requests for assistance and assessments of the threat of bird strike hazards at airports. Table 1.1 lists WS' technical assistance projects involving bird damage or threats of bird damage to those four major resource types in Ohio from the federal fiscal year[4] (FY) 2009 through FY 2013.

Technical assistance has been provided by WS to those persons requesting assistance with resolving damage or the threat of damage by providing information and recommendations on methods and techniques to reduce damage that can be conducted by the requestor without WS' direct involvement in managing or preventing the damage. Wildlife Services' technical assistance activities will be discussed further in Chapter 3 of this EA. The technical assistance projects conducted by WS are representative of the damage and threats that are caused by birds in Ohio. From FY 2009 through FY 2013, WS has conducted 624 technical assistance projects that addressed damage and threats of damage associated with those bird species addressed in this assessment. Many of the projects involved multiple resources and multiple species (Table 1.1).

Table 1.1. Technical assistance projects performed by Ohio WS for FY09-FY13.

Species	Projects	Species	Projects
Great Blue Heron	48	European Starling	36
Great Egret	9	House Finch	1
Green Heron	8	House Sparrow	2
Black-crowned Night Heron	4	American Robin	13
Short-billed Dowitcher	1	Northern Mockingbird	2
Willet	1	Eastern Meadowlark	2
Greater Yellowlegs	1	Lapland Longspur	2
Lesser Yellowlegs	1	Northern Cardinal	4
Semi-palmated Plover	1	Snow Bunting	2
Least Sandpiper	1	American Tree Sparrow	2
Pectoral Sandpiper	1	Field Sparrow	1
Semi-palmated Sandpiper	1	Horned Lark	2
Solitary Sandpiper	1	Eastern Bluebird	1
Spotted Sandpiper	1	Belted Kingfisher	12
Upland Sandpiper	1	Tree Swallow	2
Killdeer	3	Barn Swallow	11
Bonaparte's Gull	4	Bank Swallow	2
Ring-billed Gull	41	Cliff Swallow	1
Herring Gull	30	Chimney Swift	1
American Coot	2	Downy Woodpecker	7
Pied-billed Grebe	1	Hairy Woodpecker	1
Mute Swan	4	Northern Flicker	7
Trumpeter Swan	1	Red-headed Woodpecker	2
Canada Goose	40	Pileated Woodpecker	1
Feral Goose	3	Yellow-bellied Sapsucker	1
Wood Duck	3	American Kestrel	4
Mallard	29	Peregrine Falcon	5
Lesser Scaup	2	Sharp-shinned Hawk	1
Blue-winged Teal	2	Cooper's Hawk	14
Red-breasted Merganser	1	Red-shouldered Hawk	9
Ruddy Duck	2	Red-tailed Hawk	29
Feral Duck	2	Rough-legged Hawk	3
Ring-necked Pheasant	1	Northern Harrier	2

[4]The federal fiscal year begins on October 1 and ends on September 30 the following year.

Species	Projects	Species	Projects
Free-ranging Chicken	1	Osprey	5
Wild Turkey	7	Bald Eagle	5
Rock Pigeon	24	Black Vulture	38
Mourning Dove	6	Turkey Vulture	42
American Crow	20	Barred Owl	1
Common Grackle	2	Barn Owl	1
Blackbird (Mixed Species)	14	Eastern Screech Owl	1
Red-winged Blackbird	7	Short-eared Owl	3
Brown-headed Cowbird	3	Great-horned Owl	8
TOTAL:		**624**	

The need for action is based on current and anticipated future request for WS assistance with bird damage management (BDM). A summary of requests for assistance is provided in Table 1.2. Descriptions of the damage categories (human health and safety, agriculture, natural resources) are provided below.

Table 1.2. Requests to WS for assistance with bird damage management for FY09-FY13.

SPECIES	RESOURCES NEGATIVELY IMPACTED BY BIRDS					
	Human Health & Safety (Aviation/General)	Agriculture (aquaculture)	Agriculture (Field Crops)	Livestock (Feed or Animal Health)	Property (Buildings, Boats, Structures)	Natural Resources
Shorebirds	X				X	
American Crow	X		X		X	X
Red-winged Blackbird	X	X	X		X	X
Eastern Bluebird	X					
Northern Cardinal	X				X	X
American Robin	X		X		X	
Swallows/Swifts	X				X	
House Sparrow	X			X	X	X
Sparrows (other)	X				X	
European Starling	X		X	X	X	
Brown-headed Cowbird	X				X	X
Common Grackle	X					
Wild Turkey	X		X		X	
Herring Gull	X				X	
Ring-billed Gull	X	X			X	X
Gulls (other)	X				X	
Caspian Tern					X	
Killdeer	X				X	
Canada Goose	X		X		X	
Red-breasted Merganser		X				
Mallard	X				X	X
Lesser Scaup					X	
Blue-winged Teal	X				X	
Wood Duck	X				X	
American Coot	X				X	
Common Loon					X	
Mourning Dove	X				X	X
Rock Dove	X			X	X	
Mute Swan						X
Bald Eagle	X				X	
Songbirds (other)	X		X		X	

SPECIES	RESOURCES NEGATIVELY IMPACTED BY BIRDS					
	Human Health & Safety (Aviation/General)	Agriculture (aquaculture)	Agriculture (Field Crops)	Livestock (Feed or Animal Health)	Property (Buildings, Boats, Structures)	Natural Resources
Great Blue Heron	X	X			X	X
Green Heron		X				X
Black-crowned Night Heron		X				
Great Egret		X			X	X
Belted Kingfisher		X				X
Pied-billed Grebe					X	X
Great Horned Owl					X	
Short-eared Owl	X				X	
Eastern Screech Owl				X		
Red-tailed Hawk	X	X		X	X	
Rough-legged Hawk	X				X	
Red-shouldered Hawks	X			X	X	
Sharp-shinned Hawk					X	
American Kestrel	X				X	X
Peregrine Falcon	X				X	
Cooper's Hawk	X			X	X	
Northern Harrier				X	X	
Osprey	X	X			X	
Turkey Vulture	X		X	X	X	
Black Vulture	X		X	X	X	
Northern Flicker	X		X			
Downy Woodpecker					X	
Hairy Woodpecker					X	
Woodpeckers (other)					X	

Need for Bird Damage Management to Protect Human Health and Safety

Several bird species listed in Table 1.1 can be closely associated with human habitation and often exhibit gregarious roosting behavior, such as vultures, waterfowl, gulls, crows, swallows, grackles, cowbirds, and red-winged blackbirds. The close association of those bird species with human activity can pose threats to human safety from disease transmission, threaten the safety of air passengers if birds are struck by aircraft, excessive droppings can be aesthetically displeasing, and aggressive behavior, primarily from waterfowl, can pose risks to human safety.

Disease Transmission

Birds can be vectors of diseases (zoonoses) that are transmittable to humans or they act as reservoirs for a disease which subsequently infects a host that spreads the disease to humans (Table 1.3; Weber 1979, Conover 2002). Birds can play an important role in the transmission of zoonotic diseases (i.e., animal diseases transmissible to humans) where humans may encounter fecal droppings of those birds. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, European starlings, and house sparrows. Few studies are available on the occurrence and transmission of

zoonotic diseases in wild birds. Study of this issue is complicated by the fact that some disease-causing agents associated with birds may also be contracted from other sources. The risk of disease transmission from birds to humans is likely very low. The presence of disease causing organisms in bird feces is a result of the pathogens being present in the environment in which birds live. Birds likely acquire disease-causing organisms through ingestion of pathogens that originated in the environment. Disease-causing organisms do not originate within birds (i.e., birds do not produce disease-causing organisms), but those birds can act as reservoirs for disease causing organisms that are of concern to human safety.

Wildlife Services' primary involvement in the management of these types of diseases would be to aid other federal, state, and local government and research entities in monitoring for the presence or absence of diseases in wild and feral animals. This information can be used to predict potential risks to human health and safety and aid agencies in directing funding and management efforts to areas with greatest risk. In the event of a disease outbreak, WS could also be asked to conduct localized population reduction to prevent spread of disease to other areas. Most surveillance efforts use nonlethal methods, and, to date, no birds have been lethally removed specifically for disease surveillance. However, WS has opportunistically collected samples from birds killed by hunters and birds killed during other types of bird damage management activities (e.g., bird hazard management at airports).

This discussion includes a description of more common diseases associated with wild and feral birds. It is possible that WS may receive a request from state or local human health and wildlife agencies to conduct surveillance for new diseases that are not on this list. In these instances, WS could conduct surveillance for or work with regulatory agencies to manage disease in birds so long as the methods used and anticipated environmental impacts are within the parameters analyzed in this EA, and the methods are allowed under the selected management alternative. The material below is provided as an indication of the nature and range of situations where WS may be requested to provide assistance.

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Table 1.3. Diseases transmissible to humans and livestock associated with feral domestic Pigeons, Starlings, and Sparrows (Weber 1979, Personal Comm. w/Craig Hicks WDB-WS).

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
Bacterial:			
Erysipeloid	skin eruption with pain, itching; headaches, chills, joint pain, prostration, fever, vomiting	sometimes - particularly to young children, old or infirm people	serious hazard for the swine industry
Salmonellosis	gastroenteritis, septicemia, persistent infection	possible, especially in individuals weakened by other disease or old age	causes abortions in mature cattle, possible mortality in calves, decrease in milk production in dairy cattle
Pasteurellosis	respiratory infection, nasal discharge, conjunctivitis, bronchitis, pneumonia, appendicitis, urinary bladder inflammation, abscessed wound infections	Rarely	may fatally affect chickens, turkeys and other fowl
Listeriosis	conjunctivitis, skin infections, meningitis in newborns, abortions, premature delivery, stillbirth	sometimes - particularly with newborns	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles
Viral:			
Meningitis	inflammation of membranes covering the brain , dizziness, and nervous movements	possible — can also result as a secondary infection with listeriosis, salmonellosis, cryptococcosis	causes middle ear infection in swine, dogs, and cats
Encephalitis (7 forms)	headache, fever, stiff neck, vomiting, nausea, drowsiness, disorientation	mortality rate for eastern equine encephalomyelitis may be around 60%	may cause mental retardation, convulsions and paralysis

Disease	Human Symptoms	Potential for Human Fatality	Effects on Domestic Animals
Mycotic (fungal):			
Aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	Not usually	causes abortions in cattle
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	Rarely	affects horses, dogs and cats
Candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	Rarely	causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle
Cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	possible especially with meningitis	chronic mastitis in cattle, decreased milk flow and appetite loss
Histoplasmosis	pulmonary or respiratory disease. May affect vision	possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	actively grows and multiplies in soil and remains active long after birds have departed
Protozoal:			
American Trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on Pigeons
Toxoplasmosis	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible	may cause abortion or still birth in humans, mental retardation
Rickettsial/ Chlamydial:			
Chlamydiosis	pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	occasionally, restricted to old, weak or those with concurrent diseases	in cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Psittacosis *Chlamydophila psittac*	flu-like symptoms with upper and lower respiratory involvement, can have neurological complications as well	possible if contact with infected bird or aerosolized droppings, can be fatal if untreated	often rapidly fatal in birds, affects pigeons, domestic chickens and turkeys, and domestics ducks and geese
Q Fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible	may cause abortions in sheep and goats

Histoplasmosis: Soils that are enriched by bird droppings, usually from large flocks of roosting birds such as blackbirds, gulls, pigeons, and vultures, can promote the growth of the fungus, *Histoplasmosis capsulatum*, which is endemic to the U.S. (Southern 1986). Histoplasmosis is a fungus that grows in the upper two inches of soil where bird or bat droppings have accumulated for three or more years (Lenhart et al. 2004, Weeks 1984). When soil containing the fungus is disturbed, fungal spores become airborne and if inhaled may cause the respiratory disease (Lenhart et al. 2004). Although most individuals who are infected with Histoplasma are asymptomatic, the acute form of the disease can be caused by exposure to a large "dose" of spores. This can occur in when a large accumulation of droppings on soil are disturbed, during construction, demolition, etc.

Avian Influenza: (AI) 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. However, even the strains which do not cause severe illness in birds are a concern for human and animal health officials because the viruses have the potential to become virulent and transmissible to other species through mutation and reassortment (Clark 2003).

The occurrence of highly pathogenic (HP) H5N1 AI virus 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 change 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 highly pathogenic 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, infected travelers, and the migration of infected wild birds.

Wildlife Services has been one of several agencies and organizations participating in surveillance for AI virus in migrating birds in North America. During FY08 WS, ODW, and other cooperators collected 1,305 samples for HP H5N1 AI surveillance, in FY09 1,500 samples, and in FY10, 1,002 samples. These samples were taken from over 20 species of birds, primarily waterfowl, gulls, and shorebirds. None of the birds sampled were lethally removed through methods for the sole purpose of sampling although the agencies did opportunistically collect samples from birds killed by other sources such as hunter-killed birds and birds lethally removed under USFWS Depredation permits. 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.

Aviation Safety at Airports and Military Installations

Bird collisions with aircraft (bird strikes) kill birds, damage aircraft and pose a serious risk to public safety. Between 1990 and 2013 there were 12,457 wildlife strikes in the U.S. that caused damage to aircraft, of these 92% were caused by birds (Dolbeer et al. 2014). In 1981, during the Cleveland Airshow, Lt. Col. David L. Smith, commander of the Thunderbirds, was killed after his t-38 Talon ingested several gulls, stalling the engine and resulting in the t-38 crashing into Lake Erie (http://www.clevelandairshow.com/press_room/historical.htm). During FY04, an aircraft struck a Mourning Dove at a northern Ohio airport causing approximately $1.4 million worth of damage to the aircraft (Cleary et al. 2006). Wildlife Services realizes the statistical chance of a damaging bird strike is small, but threat to human life, and the costs associated with a strike can be extremely high.

Civil and military aviation communities have recognized that the threat to aviation from collisions with wildlife is substantial and increasing (Dolbeer et al. 2011). Nationwide populations of several large bird species including turkey vultures, black vultures, bald eagles, resident Canada geese, American white pelicans (*Pelecanus erthrorhynchos*), and double-crested cormorants have increased substantially in recent decades (Dolbeer and Eschenfelder 2003; Sauer et al. 2014). Federal Aviation Administration's guidelines require that aircraft engines be designed to withstand ingestion of a four pound bird without and uncontained failure, but several of the large bird species noted above can have body masses greater than four pounds. Commercial air traffic has also increased from approximately 18 million aircraft movements in 1980 to 24.6 million in 2013 (Dolbeer et al. 2014).

When birds enter or exit a roost in large flight lines at or near airports or when present in large flocks foraging on or near an airport, those bird species represent a safety threat to aviation. Vultures and raptors can also present a risk to aircraft because of their large body mass and slow-flying or soaring behavior. Vultures are considered the most hazardous bird for an aircraft to strike based on the frequency of strikes, effect on flight, and amount of damage caused by vultures throughout the country (Dolbeer et

al. 2000). Mourning doves also present risks when their late summer behaviors include creating large roosting and loafing flocks. Their feeding, watering, and gritting behavior on airport turf and runways further increases the risk of bird-aircraft collisions.

The FAA is responsible for setting and enforcing the Federal Aviation Regulations and policies to enhance public safety. For commercial airports, 14 CFR 139.337 (Wildlife Hazard Management) directs the airport sponsor to conduct a wildlife hazard assessment if an air carrier aircraft experiences multiple wildlife strikes or an air carrier aircraft experiences substantial damage from striking wildlife. Wildlife Services works with the FAA under a Memoranda of Understanding (MOU) to provide wildlife damage management information or services, upon request, to airport managers. Wildlife Services provided technical assistance to 30 civilian airports, one military airfield, six joint use airfields, and operational assistance with wildlife hazard management at seven civilian airports, one military airfield, and three joint use airfields in Ohio. In addition, WS managed wildlife hazards at United States Army Corps of Engineers land because it is adjacent to a northern Ohio airport.

Sometimes WS evaluates wildlife hazards at airports and then provides wildlife hazard assessments which outline the detected wildlife hazards, and assist airports in developing wildlife hazard management plans to address wildlife threats. These plans may include specific recommendations to reduce threats associated with a particular wildlife species, including birds. Wildlife Services may also assist airport managers in obtaining USFWS Depredation Permits (DPs) to reduce threats to aircraft from migratory birds, or may provide operational assistance with conducting wildlife hazard management activities.

Ohio Wildlife Services has written three wildlife hazard management plans for different airports and fourteen formal wildlife hazard assessments that provided airports with the necessary information to identify problem species, seasonal trends in wildlife abundance, abatement recommendation, and legal issues (e.g., permit requirements) relevant to the management of these species.

Additional Threats to Human Health and Safety

With the growth of both human and many wildlife populations, interactions between the two groups become more and more common. The increased interaction can lead to habituation of the wildlife toward humans. Some species such as raptors and waterfowl can display aggression towards people when nesting. Wildlife Services has received increasing numbers of requests for assistance with such situations.

Wildlife Services also receives requests for assistance with instances of birds (usually gulls) nesting near building air-intake vents. Feathers, fecal material and other substances are pulled into the building ventilation system and cause health problems (e.g., allergy and respiratory problems) for employees. Some people exposed to strong ammonia odors from large bird roosts report difficulty breathing. There have been problems with health risks caused scavenging birds (usually gulls) which take material from waste disposal sites and drop it in municipal water reservoirs and/or other areas used by humans.

Need for Bird Damage Management to Reduce Damage to Property

Property damage caused by birds can entail numerous resources and usually is not important nationally but may be significant on a local or regional basis. Woodpecker damage to residential dwellings from a national perspective is minimal; however, from a local perspective may cause home owners thousands of dollars in damages. House sparrows and starlings may damage buildings by pecking foam insulation and create aesthetic problems with their droppings and nesting materials.

Instances of property damage from birds may include Canada geese defacing property due to overgrazing and deposition of large amounts of fecal material. The costs of reestablishing over-grazed lawns and cleaning goose droppings from sidewalks have been estimated at more than $60 per bird (Allan et at. 1995). Roof-nesting gulls are undesirable because they cause damage to structures, plug drains with nesting material and food remains, defecate on vehicles, and harass maintenance personnel (Belant 1993). Black vultures can damage buildings by breaking or tearing roof shingles, and homes and vehicles by pulling rubber seals from windowpanes (Lowney 1999).

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. Pigeon droppings can also deface signs and cause significant losses to sign companies attempting to maintain billboards.

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 four years. Despite the cleaning process, nutrients from the excrement had 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 exacerbates 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 having the job done by a contractor.

Fecal accumulations can also cause aesthetic problems when in high traffic areas. A winter starling roost of tens of thousands of birds developed under a structure that spanned the drop-off zone at a major airport in Ohio. The droppings from this roost accumulated very quickly and the area had to be swept daily, power-washed weekly, and repainted at intervals because the paint on the structure became corroded. Hundreds of man-hours were spent on harassment to try to disperse the roost. In addition, thousands of dollars were spent on removing landscaping from the area that was attractive to starlings as roosting sites. The structure was partially netted; however, several thousand starlings still use the un-netted areas as a winter roost.

Problems also occur 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 remotely but older 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.

Need for Bird Damage Management to Protect Agricultural Resources

Aquaculture Resources

Bird damage to aquaculture resources can have significant economic impacts. Hoy et al. (1989) estimated that wading birds feeding at a minnow facility may consume $0.10 to $1.12 per bird which could translate into a loss in excess of $10,000 for a three month period. In a survey of fish hatcheries in the eastern United States, Parkhurst et al. (1987) estimated that most hatcheries lost in excess of $7,600 worth of fish production to bird predation annually. In addition to direct losses through consumption, disease transmission from wild fish populations to aquaculture facilities or between aquaculture facilities may pose the greatest economic risk to fish hatcheries.

Field Crops

Canada geese and blackbirds can cause considerable damage to field crops. The amount of damage and subsequent monetary losses vary considerably each year based upon seasonal variations in migrations, spatial differences in crop placement, and temporal differences affecting planting and harvesting dates. Between FY09 and FY13 $756,040 of damage, mostly from blackbirds to sweet corn, was reported to Ohio WS.

Blackbirds routinely damage seeded and headed rice in Louisiana (Glahn and Wilson 1992) and headed sunflowers in the Dakotas (Linz et al. 1984, Homan et al. 1994, Linz and Hanzel 1997). Blackbirds and American crows routinely damage ripening sweet and field corn. Even a small amount of damage on an ear of sweet corn will render the ear worthless because most people will not purchase a damaged ear of sweet corn (Conover 2002).

Livestock Health

Pigeons, starlings, sparrows, and blackbirds have been implicated in the transmission of diseases significant to livestock production (Table 1.3). Pigeons and starlings have been shown to be vectors of transmissible gastroenteritis (TGE) virus of swine. This disease is usually fatal to young pigs and may result in weight loss for adults. Starlings are probably an important carrier of TGE. The virus can remain alive on their feet and feathers for up to 30 hours resulting in the spread of TGE among livestock facilities (McLean 1994). Cryptococcosis is a fungal disease spread by pigeons and starlings to livestock that may result in chronic, usually fatal, meningitis. The Northern fowl mite (*Ornithonyssus sylviarum*) found on pigeons is an important poultry pest (Williams and Corrigan 1994).

In addition to helping reduce specific health risks, WS could also cooperate with state and federal agencies and research institutes in conducting surveillance for diseases in wild and feral animals transmissible to domestic animals. This data can be used to predict potential risks to livestock health and aid agencies in directing funding and management efforts to areas with greatest risk. Most surveillance efforts use nonlethal methods, and, to date, no birds have been lethally removed specifically for disease surveillance. However, WS has opportunistically collected samples from birds killed by hunters and birds killed during other types of bird damage management activities (e.g., bird hazard management at airports).

Table 1.3 lists several diseases associated with wild and feral birds. Not all of these diseases are currently known to occur in Ohio. It is also possible that WS may receive a request from state or local human health and wildlife agencies to conduct surveillance for new diseases that are not on this list. Global movement of people, animals and materials increases the risk that new disease organisms may be introduced to the U.S. In these instances, WS could conduct surveillance for or work with regulatory agencies to manage disease in birds so long as the methods used and anticipated environmental impacts are within the parameters analyzed in this EA and are allowed under the selected management alternative.

Wildlife Services also receives requests for assistance concerning birds of prey depredating domestic fowl and black vultures preying on livestock. Unlike turkey vultures which are primarily scavengers, black vultures are scavengers and predators (Lowney 1999). Predation by black vultures on livestock has been reported since the 1930's including domestic pigs in Kentucky (Lovell 1947, 1952) and lambs in Ohio (Sprunt 1946). Black vulture predation on livestock is distinctive. Lowney (1999) reported black vultures removing the eyes from pigs, lambs, calves and adult cows giving birth. Vultures also attacked the animals through the rectum, penis and vagina. A less frequent point of attack on cattle was the nose and tongue. Ohio WS reported 120 animals lost to black vulture predation totaling $43,740 in from 2005-2009 (USDA 2009).

Livestock Feeds

Bird damage to agricultural crops has cost U.S. farmers more than $100 million annually (Besser 1985) and can pose significant economic threats to agricultural producers (Besser et al. 1968, Dolbeer et al. 1978, Feare 1984). As the science of raising cattle progressed from range to feedlots, bird problems intensified. Cattle in feedlots and dairies provide a tremendous feeding opportunity for birds. With modern agriculture facilities came the concept of the complete cattle diet. The complete diet contains all the nutrients and fiber that cattle need to increase weights, produce milk, and improve the flavor and texture of meat. The basic constituent of most rations is silage with the addition of barley, corn, or other grains which may be incorporated as whole, crushed or ground grains. The silage/grain mixture is normally combined with hay, or other high fiber roughage. While cattle are not able to select for certain ingredients, starlings and other birds select for grains, or other items, thereby altering the composition and energy value of the feed. A recent study indicates shape and composition feeding preferences by European starlings to different cattle feed types resulting in loss of expensive feed, negatively affecting livestock diet composition, and affecting livestock performance (Depenbusch et al 2011).

Forbes (1995) reported starlings consume up to 50% of their body weight each day. Glahn and Otis (1981) reported consumption of about 10.5 lbs of pelletized feed per 1,000 bird minutes. The removal of high energy food ingredients is believed to reduce weight gains, milk yields, and is economically significant to individual producers (Feare 1984).

From FY09 thru FY13, WS responded to 39 requests for assistance from agriculture producers that were concerned about starlings consuming livestock feed or spreading diseases to livestock. Assistance ranged from information presentations and advice on nonlethal methods to reduce and prevent loss to lethal removal of depredating birds.

Need for Bird Damage Management to Reduce Nuisance Problems

Certain bird species and their associated nesting material and droppings may create nuisances or safety hazards. Accumulations of pigeon droppings may produce an objectionable odor. Pigeon manure deposited on park benches, cars, statues, and unwary pedestrians is aesthetically displeasing. House Sparrows may also create fire hazards by placing nesting material near electrical wiring and light fixtures. Gulls create nuisances when they nest on roof tops and attempt to gain food from people eating outdoors

(Dolbeer et al. 1990). Excessive amounts of gull droppings on other structures, such as an USACE river lock, can cause slippery walking conditions and pose human safety threats after rainfall. Additionally, fecal accumulations from starlings have caused a slipping hazard on catwalks at industrial plants (along with a fire hazard at oil refineries).

Need for Bird Damage Management to Protect Natural Resources

Birds can negatively affect natural resources through habitat degradation, competition with other wildlife, and through direct depredation on natural resources. Habitat degradation occurs when large concentrations of birds in a localized area negatively affect characteristics of the surrounding habitat, which can then adversely affect other wildlife species and become aesthetically displeasing. Competition can occur when two species compete (usually to the detriment of one species) for available resources, such as food or nesting sites. Direct depredation occurs when predatory bird species feed on other wildlife species, which can negatively influence those species' populations, especially when depredation occurs on threatened and endangered (T&E) species.

Waterfowl, especially Canada geese, may cause unsanitary, unaesthetically pleasing fecal accumulations in natural areas such as state and federal parks and recreational areas. When waterfowl reside near recreational swimming areas, the accumulation of fecal matter can contaminate the water forcing the area to be closed to swimming. The EPA established recreational water quality criteria for freshwater that recommend that water body geometric mean levels should not be greater than 30 cfu of enterococci per 100 mL and 126 cfu of E. coli per 100 mL to maintain an estimated illness rate of 32 per 1,000 primary contact recreators (EPA 2012). Swimmers were cautioned to avoid the water in Buckeye Lake, located east of Columbus, Ohio in July 2014 due to the E. coli levels reaching a record high that was 40 times greater than federal safety threshold; the accumulation of geese and gull feces was identified as a contributing factor that led to these high levels (Associated Press 2014).

Ring-billed and herring gulls encroaching on the nesting habitat of other migratory bird species is also a concern. This is especially true for the black tern (*Chlidonias niger*) and the common tern (*Sterna hirundo*) which are state-listed endangered species in Ohio. Gulls arrive at colony sites well in advance of many species and simply take over traditional nesting sites and thus force the other species to nest in less suitable habitat or to abandon the site (Courtney and Blokpoel 1983). The potential for gull predation on piping plover (*Charadrius melodus*) chicks is also a concern to management agencies (USFWS 2000). The Great Lakes population of Piping Plover is listed as an endangered species.

Mute swans, a non-native invasive species originally introduced to North America for parks and ornamental ponds. Escapees from these initial introductions have established populations in all four North American migratory bird flyways. In Ohio, observations of mute swans were reported as early as1936, and were regularly observed along the lakefront after 1962; however by the 1990's they were regular visitors across the state (Peterjohn 2001). Mute swans generally do not make long-distance seasonal migrations, but may move short distances to areas where food is accessible throughout the winter. Mute swans are highly territorial and may exclude other birds, including native swans from their breeding areas. The ODW reports that competition between mute swans and state-listed endangered trumpeter swans (*Cygnus buccinator*) occurs frequently in Lake Erie marshes. Mute swans forage primarily on submerged aquatic vegetation. Individual swans may eat up to eight pounds of food per day. This vegetation is also an important food source for other waterfowl and provides food and habitat for macro invertebrates. Foraging by concentrations of mute swans can adversely impact submerged aquatic vegetation. Considering the potential from interspecific competition and the impact foraging swans can have on the ecosystem, Guillaume et al. (2014) concluded that culling may be necessary to preserve

ecosystem integrity. Concerns regarding the impact of mute swans on native species and ecosystems in Ohio, especially trumpeter swans, have resulted in the establishment of a Mute Swan Action Plan (ODW 2010). The plan calls for public education regarding the ecological impacts and conflicts caused by mute swans; removing aggressive swans which pose a risk to human safety; removing of mute swans on, and where possible, near public land which is used by trumpeter swans; prohibiting release of mute swans into the wild; reducing the state mute swan population by removing mute swans from lands owned by the Ohio Division of Wildlife and working with landowners to implement egg oiling/addling and lethal removal on other lands in the state. Wildlife Services may be asked to assist the ODW and other landowners/managers with mute swan management.

1.4 DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS is the lead agency for this EA, and therefore, responsible for the scope, content, and decisions made. Management of migratory birds is the responsibility of the USFWS. As the authority for the overall management of bird populations, the USFWS was involved in the development of the EA and provided input throughout the EA preparation process to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The ODW is responsible for managing wildlife in the State of Ohio, including birds. The ODW establishes and enforces regulated hunting seasons, including the establishment of seasons that allow the lethal removal of some of the bird species addressed in this assessment.

For migratory birds, the ODW can establish hunting seasons for those species under frameworks determined by the USFWS. Wildlife Services' activities to reduce and/or prevent bird damage would be coordinated with the USFWS and the ODW, which ensure WS' actions are incorporated into population objectives established by those agencies. The lethal removal of many of the bird species addressed in this EA can only occur when authorized by a depredation permit issued by the USFWS and/or in communication with the ODW; therefore, the lethal removal of those bird species by WS to alleviate damage or reduce threats of damage would only occur at the discretion of those agencies. In addition, WS' annual lethal removal of birds to alleviate damage or threats of damage would only occur at levels authorized by those agencies as specified in depredation permits.

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

- How can WS best respond to the need to reduce bird damage in Ohio?
- Do the alternatives have significant impacts meriting an Environmental Impact Statement (EIS)?

1.5 SCOPE OF ENVIRONMENTAL ASSESSMENT

Actions Analyzed

This EA evaluates the need for bird damage management to reduce threats to human safety and to resolve damage to property, natural resources, and agricultural resources on federal, state, tribal, municipal, and private land within the State of Ohio, wherever such management is requested by a cooperator. This EA discusses the issues associated with conducting damage management activities to meet the need for action and evaluates different alternatives to meet that need while addressing those issues.

The methods available for use under the alternatives evaluated are provided in Appendix B. The alternatives and Appendix B also discuss how methods would be employed to manage damage and threats associated with birds. Therefore, the actions evaluated in this EA are the use of those methods available

under the alternatives by WS to manage or prevent damage and threats associated with birds from occurring when permitted by the USFWS pursuant to the Migratory Bird Treaty Act (MBTA) and/or when permitted by the ODW in compliance with Ohio statutes and codes.

The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 U.S.C 703-711). A list of bird species protected under the MBTA can be found in 50 CFR 10.13.

The MBTA does allow for the lethal take of those bird species listed in 50 CFR 10.13 when depredation occurs through the issuance of depredation permits or the establishment of depredation orders. Under authorities in the MBTA, the USFWS is the federal agency responsible for the issuance of depredation permits or the establishment of depredation orders for the take of those protected bird species when damage or threats of damage are occurring. Information regarding migratory bird permits can be found in 50 CFR 13 and 50 CFR 21.

The USFWS is a cooperating agency on this EA to analyze cumulative take of those bird species addressed in this EA from the issuance of depredation permits to entities within the state and to ensure compliance with the NEPA. The USFWS has jurisdiction over the management of migratory birds and has specialized expertise in identifying and quantifying potential adverse effects to the human environment from activities to manage bird damage.

Native American Lands and Tribes

Currently there are no federally recognized Native American tribes in the state of Ohio. In the event that there is a federally recognized tribe in Ohio, WS would only conduct activities on tribal lands at the request of the tribe and after appropriate authorizations were completed. If WS enters into an agreement with a tribe for bird damage management, this EA would be reviewed and supplemented, if appropriate, to ensure NEPA compliance.

Federal, State, County, City, and Private Lands

Under two of the alternatives, WS could continue to provide bird damage management activities on federal, state, county, municipal, and private land in Ohio when a request is received for such services by the appropriate resource owner or manager. In those cases where a federal agency requests WS' assistance with managing damage caused by birds, the requesting agency would be responsible for analyzing those activities in accordance with the NEPA. However, this EA would cover such actions if the requesting federal agency determined the analyses and scope of this EA were appropriate for those actions and the requesting federal agency adopted this EA through their own Decision based on the analyses in this EA. Therefore, actions taken on federal lands have been analyzed in the scope of this EA.

Period for which this EA is Valid

If the analyses in this EA indicate an Environmental Impact Statement (EIS) is not warranted, this EA would remain valid until WS and the USFWS determine that new needs for action, changed conditions, new issues, or new alternatives having different potential environmental impacts must be analyzed. At that time, this analysis and document would be reviewed and supplemented pursuant to the NEPA. The EA would be reviewed to ensure that activities conducted under the selected alternative occur within the parameters evaluated in the EA. If the alternative analyzing no involvement in bird damage activities by WS were selected, no additional analyses would occur based on the lack of involvement by WS. The monitoring of activities by WS would ensure the EA remained appropriate to the scope of damage management activities conducted by WS in Ohio under the selected alternative, when requested.

Site Specificity

This EA analyzes the potential impacts of BDM on all public and private lands in Ohio 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. Although some of the sites where bird damage will occur can be predicted (e.g., airports), all specific locations or times where such damage will occur in any given year cannot be predicted.

The issues considered in this EA were analyzed at levels that are *"site specifically"* appropriate for this action in Ohio. Determining affects requires that WS look at the *context* of the issue and *intensity* of the action. The range of bird populations is seldom a few acres or farm but rather over a much larger area that includes different land ownerships and political boundaries. Damage management actions are generally conducted on a much smaller portion of the habitat occupied by the target birds (see Section 1.5.1).

This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever bird conflicts and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992) would be the site-specific procedure for individual actions conducted by WS in Ohio (see Chapter 3 for a description of the Decision Model and its application). Decisions made using the model would be in accordance with plans, goals, and objectives of WS, USFWS and ODW. Actions would be consistent with the management alternative selected based on this EA and any associated mitigations and standard operating procedures (SOP) described herein and adopted or established as part of the decision. The analyses in this EA are intended to apply to any action that may occur *in any locale* and at *any time* within the State of Ohio. In this way, WS believes the EA meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to meet needs for assistance with WDM in a timely fashion. In addition, in terms of considering cumulative impacts, one EA analyzing affects in Ohio will provide a better analysis than multiple EA's covering smaller zones within Ohio.

The EA also addresses the impacts of WDM on areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional wildlife damage management efforts could occur. Thus, the EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Summary of Public Involvement

Issues and alternatives related to bird damage management as conducted by WS were initially developed by WS in consultation with the USFWS and the ODW. Issues were defined and preliminary alternatives were identified through the scoping process. As part of this process, and as required by the Council on Environmental Quality (CEQ) and APHIS' NEPA implementing regulations, this document will be noticed to the public through legal notices published in local print media, through the APHIS stakeholder registry to parties that have requested to be notified or have been identified to have an interest in the reduction of threats and damage associated with birds, and by posting the EA on the APHIS website at http://www.aphis.usda.gov/wildlifedamage/nepa.

Wildlife Services and the USFWS will provide for a minimum of a 30-day comment period for the public and interested parties to provide new issues, concerns, and/or alternatives. Through the public involvement process, WS will clearly communicate to the public and interested parties the analyses of potential environmental impacts on the quality of the human environment. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA should be revisited and, if appropriate, revised prior to issuance of a decision.

1.6 RELATIONSHIP OF THIS DOCUMENT TO OTHER ENVIRONMENTAL DOCUMENTS

Reducing Pigeon, Starling, Sparrow, Blackbird and Crow Damage Through and Integrated Damage Management Program in the State of Ohio (USDA 2003b)

Wildlife Services completed a statewide EA that reviewed alternatives for rock pigeon, European starling, house sparrow, blackbird, and crow damage in Ohio (USDA 2003b). The decision on this new EA will supersede the 2003 decision.

Wildlife Damage Management at Airports in Ohio (USDA 2007)

Wildlife Services prepared a statewide EA to address wildlife hazard management at airports in Ohio. The decision on this new EA will supersede the 2007 decision.

Final Environmental Assessment Depredation Permits for the Control and Management of Gulls in the Great Lakes Region

The USFWS Region 3 prepared an EA and signed a FONSI (USFWS 2000) for the management of Ring-billed and Herring Gull damage to protect human health and safety, property and the productivity of other colonial water birds. The alternative selected by the USFWS allows for the issuance of depredation permits for the take of ring-billed and herring gulls for damage management.

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

On August 20, 2007 the USFWS issued Final Regulations for Managing Resident Canada Goose Populations (FR Vol. 72, No 160, 7 pages 46403-46409). Pertinent and current information available in the FEIS has been incorporated by reference into this EA.

USDA, APHIS, Wildlife Service Raptor and Owl Relocation Plan for Ohio (USDA 2013)

This document reviews the need for management of raptors for human health and safety and to prevent property damage. It identifies trap and relocation techniques as part of an integrated management program.

Mute Swan Action Plan (ODW 2010)

This is an Ohio Division of Wildlife document outlining damages caused by mute swans and the actions that they are taking to mitigate the damage. Changes in the need for action and the affected environment have prompted WS and cooperating agencies to initiate this new analysis to address the need for bird damage management. This EA will address more recently identified changes and will assess the potential environmental impacts of program alternatives based on a new need for action, primarily a need to address damage and threats of damage associated with several additional species of birds.

Proposal to Permit Take as provided under the Bald and Golden Eagle Protection Act Final Environmental Assessment

Developed by the USFWS, this EA evaluated the issues and alternatives associated with the promulgation of new regulations to authorize the "*take*" of bald eagles and golden eagles as defined under the Bald and Golden Eagle Protection Act. The preferred alternative in the EA evaluated the authorization of disturbance take of eagles, the removal of eagle nests where necessary to reduce threats to human safety, and the issuance of permits authorizing the lethal take of eagles in limited circumstances, including authorizing take that is associated with, but is not the purpose of, an action (USFWS 2010). A Decision and Finding of No Significant Impact (FONSI) was made for the preferred alternative in the EA. The selected alternative in the EA established new permit regulations for the "*take*" of eagles (see 50 CFR 22.26) and a provision to authorize the removal of eagle nests (see 50 CFR 22.27). The USFWS published a Final Rule on September 11, 2009 (74 FR 46836-46879).

1.7 AUTHORITY OF FEDERAL AND STATE AGENCIES

The authorities of WS and other agencies as those authorities relate to conducting wildlife damage management activities are discussed by agency below:

Wildlife Services' Legislative Authority

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

US Fish and Wildlife Service's Authority

The USFWS mission is to conserve, protect, and enhance fish and wildlife along with their habitats for the continuing benefit of the American people. Responsibilities are shared with other federal, state, tribal, and local entities; however, the USFWS has specific responsibilities for the protection of Threatened &Endangered species under the ESA, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters that the USFWS administers for the management and protection of those resources. The USFWS also manages lands under the National Wildlife Refuge System.

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the MBTA and those that are listed as T&E under the ESA. The take of migratory birds is prohibited by the MBTA. However, the USFWS can issue depredation permits for the take of migratory birds when certain criteria are met pursuant to the MBTA. Depredation permits are issued to take migratory birds to alleviate damage and threats of damage. Under the permitting application process, the USFWS requires applicants to describe prior non-lethal damage management techniques that have been

used. In addition, the USFWS can establish orders that allow for the take of those migratory birds addressed in those orders without the need for a depredation permit.

The USFWS authority for migratory bird management is based on the MBTA of 1918 (as amended), which implements treaties with the United States, Great Britain (for Canada), the United Mexican States, Japan, and the Soviet Union. Section 3 of this Act authorized the Secretary of Agriculture:

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

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

DPs are not necessary to use nonlethal methods such as harassment to reduce damage by most migratory birds, so long as the method does not disturb birds with nests and eggs. However, permits are needed to use nonlethal methods on eagles (protected under the MBTA and Bald and Golden Eagle Protection Act) and threatened and endangered species. [5]

United States Environmental Protection Agency (EPA)

The EPA is responsible for implementing and enforcing the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) which regulates the registration and use of pesticides, including repellents for dispersing birds and avicides available for use to lethally remove birds.

United States Food and Drug Administration (FDA)

The FDA is responsible for protecting the public health by assuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation's food supply, cosmetics, and products that emit radiation. The FDA is also responsible for advancing the public health by helping to speed innovations that make medicines and foods more effective, safer, and more affordable; and helping the public get the accurate, science-based information they need to use medicines and foods to improve their health.

Ohio Department of Natural Resources, Division of Wildlife (ODW)

The ODW is the division within the Ohio Department of Natural Resources which is responsible for "conserving and improving fish and wildlife resources and their habitats for sustainable use and appreciation by all." The powers and responsibilities of the ODW are outlined in OAC 1531.04. This includes issuing depredation permits for deer and turkey, and overseeing management of state threatened and endangered species.

[5] Additional state permits may be needed to use nonlethal methods on state-listed threatened and endangered species.

Ohio Department of Agriculture (ODA)

The ODA is responsible for providing regulatory protection to producers, agribusinesses, and the consuming public; promoting Ohio agricultural products in domestic and international markets; and educating citizens about our agricultural industry. It enforces state laws pertaining to the use and application of pesticides, including those related to the registration of pesticide products, licensing of private and commercial pesticide applicators, and licensing of pesticide businesses.

US Army Corps of Engineers (USACE)

The USACE is a major cooperating agency with WS to help resolve wildlife damage management in Ohio. The mission of the USACE is to deliver vital public and military engineering services and partnering in peace and war, to strengthen our Nation's security, energize the economy, and reduce risks from disasters.

1.8 COMPLIANCE WITH LAWS AND STATUTES

Several laws or statutes authorize, regulate, or otherwise would affect WS' activities under the alternatives. Wildlife Services would comply with all applicable federal, state, and local laws and regulations in accordance with WS Directive 2.210. Those laws and regulations relevant to managing bird damage in the state are addressed below:

National Environmental Policy Act (NEPA)

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

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

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

The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 USC 703-711). A list of bird species protected under the MBTA can be found in 50 CFR 10.13.

The MBTA also provides the USFWS regulatory authority to protect families of migratory birds. The law prohibits any "*take*" of migratory bird species by any entities, except as permitted by the USFWS. Under permitting guidelines in the Act, the USFWS may issue depredation permits to requesters experiencing damage caused by bird species protected under the Act. Information regarding migratory bird permits can be found in 50 CFR 13 and 50 CFR 21. All actions analyzed in this EA would be conducted in compliance with the regulations of the MBTA, as amended.

The law was further clarified to include only those birds afforded protection from take in the United States by the Migratory Bird Treaty Reform Act of 2004. Under the Reform Act, the USFWS published a list of bird species not protected under the MBTA (70 FR 12710-12716). Free-ranging or feral domestic waterfowl, mute swans, ring-necked pheasants (*Phasianus colchicus*), wild turkeys, monk parakeets (*Myopsitta monachus*), rock pigeons, European starlings, and house sparrows are not protected from take under the MBTA. A permit from the USFWS to take those species is not required. However, a permit from the ODW may be required to take those species.

In addition to the issuance of depredation permits for the take of migratory birds, the Act allows for the establishment of depredation orders that allow migratory birds to be taken without a depredation permit when certain criteria are met.

ODW Depredation Order for Canada Geese

The ODW has been issued a special Canada goose permit from the USFWS under 50 CFR 21.26. Under this permit the ODW is given the authority to issue Canada goose egg and nest destruction permits as well as lethal shooting permits for agricultural damage for the state of Ohio The applicant does not need a USFWS permit for the destruction of Canada goose eggs or nests under this special use permit. The ODW is responsible for issuing, monitoring and reporting permit numbers, nest and egg take information and Canada goose population estimates to the USFWS under this special permit. Under these guidelines and OAC 1501:31-15-03, Part H; ODW has the authority for managing resident Canada geese from March 1 through August 31. Subject to federal regulations, the ODW may authorize licensed nuisance wild animal trappers, landowners, or agents of the landowner to remove or destroy any Canada geese and/or nest and eggs when known to be destroying property or causing a risk to human health or safety upon his or her land. Upon receipt by the ODW of information from the owner, that Canada geese are damaging property on the land on which he resides or controls, together with a statement regarding location of the property damages, the nature and extent of the damage, and previous methods employed to alleviate damages, the ODW shall make an investigation. If, after investigation, the ODW finds that damage does exist and can be abated only by removing or destroying Canada geese and/or any associated nests and eggs, a permit shall be issued by ODW.

Depredation Order for Blackbirds, Cowbirds, Grackles, Crows, and Magpies (50 CFR 21.43)

Pursuant to the MBTA under 50 CFR 21.43, a depredation permit is not required to lethally take blackbirds when those species are found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (Sobeck 2010). Those bird species that can be lethally taken under the blackbird depredation order that are addressed in the assessment include American crows, fish crows (*Corvus ossifrangus*), red-winged blackbirds, common grackles, boat-tailed grackles (*Quiscalus major*), and brown-headed cowbirds.

Bald and Golden Eagle Protection Act (16 USC 668-668c), as amended

Populations of bald eagles showed periods of steep declines in the lower United States during the early 1900s attributed to the loss of nesting habitat, hunting, poisoning, and pesticide contamination. To curtail declining trends in bald eagles, Congress passed the Bald Eagle Protection Act (16 USC 668) in 1940 prohibiting the take or possession of bald eagles or their parts. The Bald Eagle Protection Act was amended in 1962 to include the golden eagle and is now referred to as the Bald and Golden Eagle Protection Act. Certain populations of bald eagles were listed as *"endangered"* under the Endangered Species Preservation Act of 1966, which was extended when the modern Endangered Species Act (ESA) was passed in 1973. The *"endangered"* status was extended to all populations of bald eagles in the lower 48 States, except populations of bald eagles in Minnesota, Wisconsin, Michigan, Washington, and Oregon, which were listed as *"threatened"* in 1978. As recovery goals for bald eagle populations began to be reached in 1995, all populations of eagles in the lower 48 States were reclassified as *"threatened"*. In 1999, the recovery goals for populations of eagles had been reached or exceeded and the eagle was proposed for removal from the ESA. The bald eagle was officially de-listed from the ESA on June 28, 2007 with the exception of the Sonora Desert bald eagle population. Although officially removed from the protection of the ESA across most of its range, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act.

Under the Bald and Golden Eagle Protection Act (16 USC 668-668c), the take of bald eagles is prohibited without a permit from the USFWS. Under the Act, the definition of "*take*" includes actions that "*pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb*" eagles. The regulations authorize the United States Fish and Wildlife Service to issue permits for the take of bald eagles and golden eagles on a limited basis (see 74 FR 46836-46837, 50 CFR 22.26, 50 CFR 22.27). As necessary, Wildlife Services would apply for the appropriate permits as required by the Bald and Golden Eagle Protection Act.

Endangered Species Act (ESA)

Under the ESA, all federal agencies will seek to conserve T&E species and will utilize their authorities in furtherance of the purposes of the Act (Sec. 2(c)). Wildlife Services conducts Section 7 consultations with the USFWS to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency...is not likely to jeopardize the continued existence of any endangered or threatened species...Each agency will use the best scientific and commercial data available*" (Sec. 7 (a) (2)).

As part of the development of this EA, WS has also consulted with the USFWS concerning T&E species in Ohio in regards to proposed bird damage management activities, which will be discussed in Chapter 4 of this EA.

National Historic Preservation Act (NHPA) of 1966, as amended

The NHPA and its implementing regulations (36 CFR 800) require federal agencies to initiate the Section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under Section 106. None of the bird damage management methods described in this EA that might be used under the alternatives causes major ground disturbance, any physical destruction or damage to property, any alterations of property, wildlife habitat, or landscapes, nor involves the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to

introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that could be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, the site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

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

Environmental Justice - Executive Order 12898

Executive Order 12898 promotes the fair treatment of people of all races, income levels, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental justice is a priority within APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies, and activities on minorities and persons or populations of low income. APHIS implements Executive Order 12898 principally through its compliance with the NEPA. All WS' activities are evaluated for their impact on the human environment and compliance with Executive Order 12898. Wildlife Services' personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. It is not anticipated that the use of methods would result in any adverse or disproportionate environmental impacts to minorities and persons or populations of low income.

Protection of Children - Executive Order 13045

Children may suffer disproportionately for many reasons from environmental health and safety risks, including the development of their physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. Wildlife Services would only employ and/or recommend legally available and approved methods under the alternatives where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

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 MOU with the USFWS that shall promote the conservation of migratory bird populations. Wildlife Services has developed a draft MOU with the USFWS as required by this Executive Order and is currently waiting for

USFWS approval. Wildlife Services would abide by the MOU once it is finalized and signed by both parties.

Invasive Species - Executive Order 13112

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

The Native American Graves and Repatriation Act of 1990

The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue until a reasonable effort has been made to protect the items and the proper authority has been notified.

Federal Insecticide, Fungicide, and Rodenticide Act

The FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The EPA is responsible for implementing and enforcing the FIFRA. All chemical methods employed and/or recommended by the WS' program in Ohio pursuant to the alternatives would be registered with the EPA and the PCP of the ODA, when applicable. All chemical methods would be employed by WS pursuant to label requirements when providing direct operational assistance under the alternatives. In addition, WS would recommend that all label requirements be adhered to when recommending the using of chemical methods while conducting technical assistance projects under the alternatives.

Coastal Zone Management Act of 1972, as amended (16 USC 1451-1464, Chapter 33; P.L. 92583, October 27, 1972; 86 Stat. 1280)

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

New Animal Drugs for Investigational Use

The FDA can grant permission to use investigational new animal drugs (see 21 CFR 511). The sedative drug alpha-chloralose is registered with the FDA to capture waterfowl, coots, and pigeons. The use of alpha-chloralose by WS was authorized by the FDA, which allows use of the drug as a non-lethal form of capture. The use of alpha-chloralose as a method for resolving waterfowl damage and threats to human safety is discussed in Appendix B of this EA.

Occupational Safety and Health Act of 1970

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

Ohio Wildlife Laws, Regulations, and Policies Regarding Bird Damage Management

OAC 1501:31-15-03 Ohio Nuisance Wild Animal Control – Establishes the conditions under which birds under state control can be managed in the event that it has become a nuisance.
ORC 1531.01 Division of Wildlife Definitions – Defines terms such as trapping and game birds.
ORC 1531.25 Protection of Species Threatened with Statewide Extinction – Restricts the take or possession of native wildlife that is considered to be threatened with statewide extinction.
ORC 1533.07 Protection afforded nongame birds – Describes actions that can and cannot be taken in regards to nongame birds including eagles, osprey, blackbirds, and English sparrows.

CHAPTER 2: AFFECTED ENVIRONMENT AND ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of SOPs, and issues that will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop SOPs. Additional descriptions of affected environments will be incorporated into the discussion of the environmental effects in Chapter 4.

2.1 AFFECTED ENVIRONMENT

Bird damage or threats of damage can occur statewide in Ohio wherever birds occur. However, bird damage management would only be conducted by WS when requested by a landowner or manager and only on properties where a cooperative service agreement or other comparable document has been signed between WS and a cooperating entity. Most species of birds addressed in this EA can be found throughout the year across the state where suitable habitat exists for foraging, loafing, roosting, and breeding. Since birds can be found throughout the state, requests for assistance to manage damage or threats of damage could occur in areas occupied by those bird species.

Upon receiving a request for assistance, the proposed action alternative or those actions described in the other alternatives could be conducted on private, federal, state, tribal, and municipal lands in Ohio to reduce damages and threats associated with birds to agricultural resources, natural resources, property, and threats to human safety. The analyses in this EA are intended to apply to actions taken under the selected alternative that could occur in any locale and at any time within the analysis area. This EA analyzes the potential impacts of bird damage management and addresses activities in Ohio that are currently being conducted under a MOU or cooperative service agreement with WS where activities have been and currently are being conducted. This EA also addresses the impacts of bird damage management where additional agreements may be signed in the future.

The proposed action could be conducted anywhere bird damage and conflicts occur including private property and federal, state and local government lands where birds nest, congregate, feed, or otherwise occur. Examples of areas where bird damage management activities could be conducted are, but are not necessarily limited to: agricultural fields, orchards, farmyards, dairies, ranches, livestock operations, waste handling facilities, industrial sites, natural areas, private homes and properties, corporate properties, schools, hospitals, parks and recreation areas, swimming lakes, communally-owned homeowner/property owner association properties, wildlife refuges, wildlife management areas, lake beaches, ponds, rivers, and inlets, airports and surrounding areas.

2.2 ENVIRONMENTAL STATUS QUO

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

Most native wildlife species are protected under state or federal law. For some bird species, lethal removal during the hunting season is regulated pursuant to the MBTA by the USFWS through the

issuance of frameworks that include the allowable length of hunting seasons, methods of lethal removal, and allowed lethal removal which are implemented by the ODW. Under the blackbird depredation order (50 CFR 21.43), blackbirds can be lethally removed by any entity without a depredation permit when those species identified in the order are found committing or about to commit damage or posing a human safety threat. Pursuant to the MBTA, the USFWS can issue depredation permits to those entities experiencing damage associated with birds, when deemed appropriate. Free-ranging or feral domestic waterfowl, European starlings, rock pigeons, mute swans, ring-necked pheasants, wild turkeys, monk parakeets, and house sparrows are not protected from lethal removal under the MBTA and can be addressed without the need for a depredation permit from the USFWS.

When a non-federal entity (e.g., agricultural producers, health agencies, municipalities, counties, private companies, individuals, or any other non-federal entity) takes an action to alleviate bird damage, the action is not subject to compliance with the NEPA due to the lack of federal involvement[6] in the action. Under such circumstances, the environmental baseline or status quo must be viewed as an environment that includes those resources as they are managed or impacted by non-federal entities in the absence of the federal action being proposed. Therefore, in those situations in which a non-federal entity has decided that a management action directed towards birds should occur and even the particular methods that would be used, WS' involvement in the action would not affect the environmental status quo. Wildlife Services' involvement would not change the environmental status quo if the requestor had conducted the action in the absence of WS' involvement in the action. Since the lethal removal of birds can occur either without a permit if those species are non-native, during hunting seasons, under depredation orders, under control orders, or through the issuance of depredation permits by the USFWS and/or ODW and since most methods for resolving damage are available to both WS and to other entities, WS' decision-making ability is restricted to one of three alternatives. Wildlife Services can either provide technical assistance with managing damage with no direct involvement, take the action using the specific methods as decided upon by the non-federal entity, or take no action at which point the non-federal entity could take the action anyway either without a permit, during the hunting season, under depredation orders, under control orders, or through the issuance of a depredation permit by the USFWS and/or ODW. Under those circumstances, WS would have virtually no ability to affect the environmental status quo since the action would likely occur in the absence of WS' direct involvement.

In some situations, however, certain aspects of the human environment may actually benefit more from WS' involvement than from a decision not to assist. For example, if a cooperator believes WS has greater expertise to manage damage when compared to other entities, WS' management activities may have less of an impact on target and non-target species than if the non-federal entity conducted the action alone. The concern arises from those persons experiencing damage using methods that have no prior experience with managing damage or threats associated with birds. The lack of experience in bird behavior and damage management methods could lead to the continuation of damage, which could threaten human safety or could lead to the use of inappropriate methods in an attempt to resolve damage. Wildlife Services' personnel are trained in the use of methods, which increases the likelihood that damage management methods are employed appropriately, which can increase effectiveness, humaneness, minimizes non-target take, and reduces threats to human safety from those methods. Thus, in those situations, WS' involvement may actually provide some benefit to the human environment when compared to the environmental status quo in the absence of such involvement.

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

2.3 ISSUES ASSOCIATED WITH BIRD DAMAGE MANAGEMENT ACTIVITIES

Issues are concerns of the public and/or professional community raised regarding potential adverse effects that might occur from proposed actions. Such issues must be considered in the NEPA decision-making process. The following issues related to damage management associated with birds in Ohio were developed in consultation with the USFWS and ODW. The EA will also be made available to the public for review and comment to identify additional issues.

Issue 1 - Effects of WS Bird Damage Management on Target Species Populations

A common issue when addressing damage caused by wildlife is the potential impact of management actions on the populations of target species and the ability to harvest game species. Methods available to resolve damage or threats to human safety are categorized into non-lethal and lethal methods. Non-lethal methods available can disperse or otherwise make an area unattractive to target species causing damage, which reduces the presence of those species at the site and potentially the immediate area around the site where non-lethal methods were employed. Lethal methods would result in local population reductions in the area where damage or threats were occurring. The number of target species that could be removed from the population using lethal methods under the alternatives would be dependent on the number of requests for assistance received, the number of individual birds involved with the associated damage or threat, and the efficacy of methods employed. Under certain alternatives, both non-lethal and lethal methods could be recommended, as governed by federal, state, and local laws and regulations.

The analysis for magnitude of impact on the populations of those species addressed in the EA would be based on a measure of the number of individuals killed from each species in relation to that species' abundance. Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations would be based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations would be based on population trends and harvest trend data, when available. Lethal removal would be monitored by comparing the number killed with overall populations or trends in the population. All lethal removal of birds by WS would occur at the requests of a cooperator seeking assistance and only after the lethal removal of those birds species has been permitted by the USFWS pursuant to the MBTA, when required.

Information on bird populations and trends are often derived from several sources including the Breeding Bird Survey (BBS), the Christmas Bird Count (CBC), the Partners in Flight Landbird Population database, published literature, and harvest data. Further information on those sources of information is provided below.

Breeding Bird Survey (BBS)

Bird populations can be monitored by using trend data derived from data collected during the BBS. Under established guidelines, observers count birds at established survey points for a set duration along a pre-determined route, usually along a road. Surveys were started in 1966 and are conducted in June, which is generally considered as the period of time when those birds present at a location are likely breeding in the immediate area. The BBS is conducted annually in the United States, across a large geographical area, under standardized survey guidelines. The BBS is a large-scale inventory of North American birds coordinated by the United States Geological Survey, Patuxent Wildlife Research Center (Sauer et al. 2012). The BBS is a combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally, because of variable local habitat and climatic conditions. Trends can be determined using different population equations and tested to identify whether it is statistically significant.

Current estimates of population trends from BBS data are derived from hierarchical model analysis (Link and Sauer 2002, Sauer and Link 2011) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is also determined using BBS data (Sauer et al. 2012).

Christmas Bird Count (CBC)

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

Partners in Flight Landbird Population Estimate

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 relative abundances derived from the BBS, Rich et al. (2004) extrapolated population estimates for many bird species in North America as part of the Partners in Flight Landbird Population Estimate database. The Partners in Flight system involves extrapolating the number of birds in the 50 quarter-mile circles (total area/route = 10 mi^2) survey conducted during the BBS to an area of interest. The model used by Rich et al. (2004) makes assumptions on the detectability of birds, which can vary for each species. Some species of birds that are more conspicuous (visual and auditory) are more likely to be detected during bird surveys when compared to bird species that are more secretive and do not vocalize often. Information on the detectability of a species is combined to create a detectability factor, which may be combined with relative abundance data from the BBS to yield a population estimate (Rich et al. 2004). The Partners in Flight Science Committee (2013) updated the database in the past year to reflect current population estimates.

Annual Harvest Estimates

The populations of several migratory bird species are sufficient to allow for annual harvest seasons that typically occur during the fall migration periods of those species. Migratory bird hunting seasons are established under frameworks developed by the USFWS and implemented by the ODW. Those species addressed in this EA that have established hunting seasons include American crow, wild turkey, common snipe, Canada goose, Atlantic brant, mallard, American black duck gadwall, Northern pintail, American wigeon, wood duck, Northern shoveler, blue-winged teal, green-winged teal, canvasback, redhead, ring-necked duck, lesser scaup, greater scaup, common goldeneye, bufflehead, ruddy duck, hooded merganser, red-breasted merganser, American coot, and mourning dove.

For crows, lethal removal can also occur under the Blackbird Depredation Order established by the USFWS pursuant to the MBTA. Therefore, the lethal removal of crows can occur during annual hunting seasons and under the blackbird depredation order that allows crows to be lethally removed to alleviate damage and to alleviate threats of damage. For many migratory bird species considered harvestable during a hunting season, the number of birds harvested during the season is reported by the USFWS and/or the ODW in published reports.

Issue 2 - Effects of WS Bird Damage Management on Non-target Species Populations, Including Threatened and Endangered (T/E) Species

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on non-target species, including threatened and endangered species. Methods available to resolve damage or threats of damage can be categorized as lethal and non-lethal. Non-lethal methods disperse or otherwise make an area where damage is occurring unattractive to the species (target species) causing the damage, thereby reducing the presence of those species in the area. However, non-lethal methods also have the potential to inadvertently disperse non-target wildlife. Lethal methods remove individuals of the species (target species) causing the damage, thereby reducing the presence of those species in the area and the local population. However, lethal methods also have the potential to inadvertently capture or kill non-target wildlife.

The Endangered Species Act (ESA) makes it illegal for any person to '*take*' any listed endangered or threatened species or their critical habitat. The ESA defines take as, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 USC 1531-1544). Critical habitat is a specific geographic area or areas that are essential for the conservation of a threatened or endangered species. The Act requires that federal agencies conduct their activities in a way to conserve species. It also requires that federal agencies consult with the appropriate implementing agency (either the USFWS or the National Marine Fisheries Service) prior to undertaking any action that may take listed endangered or threatened species or their critical habitat pursuant to Section 7(a)(2) of the ESA. As part of the scoping process to facilitate interagency cooperation, WS consulted with the USFWS pursuant to Section 7 of the ESA during the development of this EA, which is further discussed in Chapter 4.

Issue 3 - Risks Posed by WS Bird Damage Management Methods to Human Health and Safety

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

Safety of Chemical Methods Employed

The issue of using chemical methods as part of managing damage associated with wildlife relates to the potential for human exposure either through direct contact with the chemical or exposure to the chemical from wildlife that have been exposed. Under the alternatives identified, the use of chemical methods would include avicides, rodenticides, immobilizing drugs, reproductive inhibitors, and repellents. Avicides are those chemical methods used to lethally remove birds. The primary pesticide used and proposed for use by Ohio WS is DRC-1339. In Ohio, DRC-1339 is registered for use by WS for management of damage associated with feral pigeons, red-winged blackbirds, brown-headed cowbirds, common grackles, European starlings, crows, and gulls.

Several avian repellents are commercially available to disperse birds from an area or discourage birds from feeding on desired resources. Avitrol is an avian repellent available for use to manage damage associated with several bird species. For those species addressed in this assessment, Avitrol is available to manage damage associated with red-winged blackbirds, common grackles, brown-headed cowbirds, European starlings, house sparrows, feral pigeons, and crows.

Other repellents are also available with the most common ingredients being polybutene, anthraquinone, and methyl anthranilate. An additional repellent being considered for use in this assessment is mesurol, which is intended for use to discourage crows from predating on eggs of T&E species. In addition, Alpha-chloralose, a sedative regulated by the FDA as an experimental drug, is also being considered as a method that could be employed under the alternatives to manage damage associated with waterfowl, where appropriate. Alpha-chloralose could be used to sedate waterfowl temporarily and lessen stress on the animal from handling and transportation from the capture site. Drugs delivered to immobilize waterfowl would occur on site with close monitoring to ensure proper care of the animal. Alpha-chloralose is fully reversible with a full recovery of sedated animals occurring. Alpha-chloralose cannot be used during hunting season or 30 days prior to hunting season to prevent secondary exposure of the drug to humans.

Nicarbazin is the only reproductive inhibitor currently registered with the EPA. Current products containing nicarbazin are available for use to manage local populations of waterfowl and pigeons by reducing or eliminating the hatchability of laid eggs. Chemical methods are further discussed in Appendix B of this EA. The use of chemical methods is regulated by the EPA through the FIFRA, the ODA, by the FDA, and by WS Directives.

Safety of Non-Chemical Methods Employed

Most methods available to alleviate damage and threats associated with birds are considered non-chemical methods. Non-chemical methods employed to reduce damage and threats to safety caused by birds, if misused, could potentially be hazardous to human safety. Non-chemical methods are also discussed in detail in Appendix B. The cooperator requesting assistance would be made aware through a MOU, cooperative service agreement, or a similar document that those devices agreed upon could potentially be used on property owned or managed by the cooperator. Many of the non-chemical methods are only activated when triggered by attending personnel (e.g., cannon nets, firearms, pyrotechnics, lasers), are passive live-capture methods (e.g., walk-in style live-traps, mist nets), or are passive harassment methods (e.g., effigies, exclusion, anti-perching devices, electronic distress calls).

The primary safety risk of most non-chemical methods occurs directly to the applicator or those persons assisting the applicator. However, risks to others do exist when employing non-chemical methods, such as when using firearms, cannon nets, or pyrotechnics. Most of the non-chemical methods available to address bird damage in Ohio would be available for use under any of the alternatives and could be employed by any entity, when permitted. Risks to human safety from the use of non-chemical methods will be further evaluated as this issue relates to the alternatives in Chapter 4.

Issue 4 - Impacts on Aesthetic Value of Birds

The public reaction to wildlife damage management is variable and mixed because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the aesthetic values of wildlife and the best ways to reduce conflicts/problems between humans and wildlife. The human attraction to animals has been well documented throughout history. The American public is no exception and today a large percentage of households have pets. Some people may also consider individual wild animals and birds as “pets” or exhibit affection toward these animals. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (e.g., wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (e.g.,

reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to the stability of natural ecosystems (e.g., ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is merely knowledge that the animals exist (Decker and Goff 1987).

Aesthetics is a philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature and is dependent on what an observer regards as beautiful. There may be some concern that the proposed damage management methods would result in the loss of aesthetic benefits to the public, resource owners, or adjacent property owners who may enjoy bird viewing. Conversely, others may see the same species as a detriment to aesthetic values. For example, while some may enjoy watching Canada geese foraging by the side of a pond, others may consider the droppings the geese leave an adverse impact on their ability to picnic or play sports in the same location.

Many people directly affected by problems and threats to public health or safety caused by birds insist upon their removal from the property or public location when they cause damage. Other people directly impacted by the problem may want to exhaust all non-lethal alternatives before attempts are made to remove the animals. Others may decide they can learn to live with the problem. Similarly, individuals not directly affected by the harm or damage caused by wildlife may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Those totally opposed to bird damage management want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed, and would strongly oppose removal of birds regardless of the amount of damage. Other members of the public oppose removal of wildlife because of human-affectionate bonds with individual animals. Some members of the public believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety.

2.4 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

Additional issues were identified by WS and the USFWS during the scoping process of this EA. These issues were considered, but not analyzed in detail for the reasons provided.

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

A concern was raised that an EA for an area as large as the State of Ohio would not meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of federal or other regulatory agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to accurately describe such locations or times in an EA or EIS. Although WS can predict some of the possible locations or types of situations and sites where some kinds of wildlife damage would occur, the program cannot predict the specific locations or times at which affected resource owners would determine a damage problem has become intolerable to the point that they request assistance from WS. In addition, the WS program would not be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and other agencies. Such broad scale population management would also be impractical or impossible to achieve within WS' policies and professional philosophies.

In terms of considering cumulative effects, one EA analyzing impacts for the entire state would provide a more comprehensive and less redundant analysis than multiple EAs covering smaller areas. If a determination were made through this EA that the proposed action or the other alternatives might have a significant impact on the quality of the human environment, then an EIS would be prepared. Based on previous requests for assistance, the WS program would continue to conduct bird damage management in a very small area of the state where damage is occurring or likely to occur.

WS' Impact on Biodiversity

None of the proposed bird damage management activities in Ohio would be conducted to eradicate a native wildlife species. Wildlife Services operates according to international, federal, and state laws and regulations and management plans enacted to ensure species viability. In addition, any reduction of a local population or group is usually temporary because immigration from adjacent areas or reproduction replaces the animals removed. Further, WS operates on only a small percentage of the land area of the state (<3.5%) (see Section 1.8.5) and WS' lethal removal of any wildlife species analyzed in this EA is a small proportion of the total range of the population. Wildlife Services operational programs may be conducted to eradicate or reduce introduced exotic species. However, these species compete with native birds for food and other resources and are not beneficial to native ecosystems. Removal of these species may have beneficial impacts on biodiversity of native systems.

A Loss Threshold should be Established before Allowing Lethal Methods

Wildlife Services is aware of concerns that federal bird damage management should not be allowed until economic losses become unacceptable. However, this type of policy would be inappropriate to apply to public health and safety situations. In addition, although some losses can be expected and tolerated by agriculture producers and property owners, WS has the legal responsibility and direction to respond to requests for bird damage management, and it is program policy to aid each requester to minimize losses. The WS Decision Model (Slate et al. 1992) is used to determine an appropriate strategy.

Furthermore, in a ruling for *Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al.,* the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that it was only necessary to show that damage from wildlife is threatened, to establish a need for wildlife damage management (U.S. District Court of Utah 1993). Thus, there is a judicial precedence indicating that is not necessary to establish criterion such as a percentage of loss of a particular resource to justify the need for damage management actions.

Bird Damage Management Should Not Occur at Taxpayer's Expense

An issue previously identified is the concern that wildlife damage management should not be provided at the expense of the taxpayer or that activities should be fee-based. Funding for damage management activities would be derived from federal appropriations and through cooperative funding. Activities conducted for the management of damage and threats to human safety from birds would be funded through cooperative service agreements with individual property owners or managers. A minimal federal appropriation is allotted for the maintenance of a WS program in Ohio. The remainder of the WS program is entirely fee-based. Technical assistance is provided to requesters as part of the federally funded activities, but all direct assistance in which WS' employees perform damage management activities is funded through cooperative service agreements between the requester and WS.

Cost Effectiveness of Bird Damage Management

The CEQ does not require a formal, monetized cost benefit analysis to comply with the NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. However, the methods determined to be most effective to reduce damage and threats to human safety caused by birds and that prove to be the most cost effective would receive the greatest application. As part of an integrated approach, evaluation of methods would continually occur to allow for those methods that are most effective at resolving damage or threats to be employed under similar circumstances where birds are causing damage or pose a threat. Additionally, management operations may be constrained by cooperator funding and/or objectives and needs.

Bird Damage Management Should Be Conducted by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce bird damage for property owners or property owners could attempt to reduce their own damage problems. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense; they are not required to comply with NEPA; or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to receive assistance from a government agency. In particular, large industrial businesses, airport managers, and cities and towns may prefer to use WS because of security and safety issues, legal requirements to be accountable to the public through NEPA compliance.

Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally remove birds. As described in Appendix B, the lethal removal of birds with firearms by WS to alleviate damage or threats would occur using a rifle or shotgun. In an ecological risk assessment of lead shot exposure in non-waterfowl birds, ingestion of lead shot was identified as the concern rather than just contact with lead shot or lead leaching from shot in the environment (Kendall et al. 1996). To address lead exposure from the use of shotguns, the standard conditions of depredation permits issued by the USFWS pursuant to the MBTA for the lethal removal of birds requires the use of non-lead shot. To alleviate concerns associated with lead exposure in wildlife, WS would only use non-lead shot as defined in 50 CFR 20.21(j) when using shotguns to remove all migratory birds.

The removal of birds by WS would occur primarily from the use of shotguns. However, the use of rifles could be employed to lethally remove some species. Birds that were removed using rifles would occur within areas where retrieval of all bird carcasses for proper disposal would be highly likely (e.g., at roost sites). With risks of lead exposure occurring primarily from ingestion of lead shot and bullet fragments, the retrieval and proper disposal of bird carcasses would greatly reduce the risk of scavengers ingesting or being exposed to lead that may be contained within the carcass.

However, deposition of lead into soil could occur if, during the use of a rifle, the projectile passes through a bird, if misses occur, or if the bird carcass is not retrieved. Laidlaw et al. (2005) reported that, because of the low mobility of lead in soil, all of the lead that accumulates on the surface layer of the soil is generally retained within the top 20 cm (about 8 inches). In addition, concerns occur that lead from bullets deposited in soil from shooting activities could lead to contamination of either ground water or surface water from runoff. Stansley et al. (1992) studied lead levels in water that was subjected directly to high concentrations of lead shot accumulation because of intensive target shooting at several shooting ranges. Lead did not appear to "*transport*" readily in surface water when soils were neutral or slightly alkaline in pH (i.e., not acidic), but lead did transport more readily under slightly acidic conditions. Although Stansley et al. (1992) detected elevated lead levels in water in a stream and a marsh that were in

the shot "*fall zones*" at a shooting range, the study did not find higher lead levels in a lake into which the stream drained, except for one sample collected near a parking lot. Stansley et al. (1992) believed the lead contamination near the parking lot was due to runoff from the lot, and not from the shooting range areas. The study also indicated that even when lead shot is highly accumulated in areas with permanent water bodies present, the lead does not necessarily cause elevated lead contamination of water further downstream. Muscle samples from two species of fish collected in water bodies with high lead shot accumulations had lead levels that were well below the accepted threshold standard of safety for human consumption (Stansley et al. 1992).

Craig et al. (1999) reported that lead levels in water draining away from a shooting range with high accumulations of lead bullets in the soil around the impact areas were far below the "*action level*" of 15 parts per billion as defined by the EPA (i.e., requiring action to treat the water to remove lead). The study found that the dissolution (i.e., capability of dissolving in water) of lead declines when lead oxides form on the surface areas of the spent bullets and fragments (Craig et al. 1999). Therefore, the transport of lead from bullets or shot distributed across the landscape is reduced once the bullets and shot form crusty lead oxide deposits on their surfaces, which serves to further reduce the potential for ground or surface water contamination (Craig et al. 1999). Those studies suggest that, given the very low amount of lead being deposited and the concentrations that would occur from WS' activities to reduce bird damage using rifles, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent.

Since the harvest of birds can occur during regulated hunting seasons, through the issuance of depredation permits, under depredation orders without the need to obtain a depredation permit, or are considered non-native with no depredation permit required for removal, WS' assistance with removing birds would not be additive to the environmental status quo. Wildlife Services' assistance would not be additive to the environmental status quo since those birds removed by WS using firearms could be lethally removed by the entities experiencing damage using the same method in the absence of WS' involvement. The amount of lead deposited into the environment may be lowered by WS' involvement in damage management activities due to efforts by WS to ensure projectiles do no pass through, but are contained within, the bird carcass, which limits the amount of lead potentially deposited into soil from projectiles passing through the carcass. The proficiency training received by WS' employees in firearm use and accuracy increases the likelihood that birds are lethally removed humanely in situations that ensure accuracy and that misses occur infrequently, which further reduces the potential for lead to be deposited in the soil from misses or from projectiles passing through carcasses. In addition, WS' involvement ensures bird carcasses lethally removed using firearms would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures bird carcass would be removed from the environment to prevent the ingestion of lead in carcasses by scavengers. Based on current information, the risks associated with lead bullets that could be deposited into the environment from WS' activities due to misses, the bullet passing through the carcass, or from bird carcasses that may be irretrievable would be below any level that would pose any risk from exposure or significant contamination of water.

Global Climate Change/Greenhouse Gas Emissions

The WS program activities that may result from the alternatives would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct or indirect emissions of greenhouse gases would not occur as a result of the proposed action. The proposed action would meet requirements of applicable federal laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

CHAPTER 3: ALTERNATIVES

Chapter 3 contains a discussion of the alternatives that were developed to address the identified issues discussed in Chapter 2. Alternatives were developed for consideration based on the issues using the WS Decision model (Slate et al. 1992). The alternatives will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences). Chapter 3 also discusses alternatives considered but not analyzed in detail, with rationale. SOPs for bird damage management in Ohio are also discussed in Chapter 3.

3.1 DESCRIPTION OF THE ALTERNATIVES

Alternative 1 – Continue the Current WS Adaptive Integrated Bird Damage Management Program (No Action/Proposed Action)

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the CEQ's (1981) definition which states that "No Action" may be interpreted as being the continuation of current management practices.

The proposed action/no action alternative would continue the adaptive integrated Ohio WS bird damage management program for the protection of agricultural and natural resources, aquaculture, property, and public health and safety. The IWDM approach would allow for the use of legally available nonlethal and lethal bird damage management methods, either singly or in combination, to meet requester needs for reducing bird damage (Appendix C).

The adaptive approach to managing damage associated with birds would integrate the use of the most practical and effective methods to resolve a request for damage management as determined by site-specific evaluation to reduce damage or threats to human safety for each request after applying the WS Decision Model. City/town managers, agricultural producers, property owners, and others requesting assistance would be provided information regarding the use of appropriate non-lethal and lethal techniques. Wildlife Services would work with those persons experiencing bird damage in addressing those birds responsible for causing damage as expeditiously as possible. To be most effective, damage management activities should begin as soon as birds begin to cause damage. Bird damage that has been ongoing can be difficult to resolve using available methods since birds are conditioned to feed, roost, loaf, and are familiar with a particular location. Subsequently, making that area unattractive using available methods can be difficult to achieve once damage has been ongoing. The USFWS could continue to issue depredation permits to WS and to those entities experiencing bird damage when requested by the entity and when deemed appropriate by the USFWS for those species that require a permit.

Under this alternative, WS could respond to requests for assistance by: 1) taking no action, if warranted, 2) providing only technical assistance to property owners or managers on actions they could take to reduce damages caused by birds, or 3) providing technical assistance and direct operational assistance to a property owner or manager experiencing damage. The lethal removal of birds can only legally occur through the issuance of a depredation permit by the USFWS and only at levels specified in the permit, unless those bird species are afforded no protection under the MBTA or a depredation/control order has been established by the USFWS in which case no permit for lethal removal is required. In addition, some species are regulated by ODW. For those species, consultation and approval of ODW will be necessary for management especially lethal removal.

Property owners or managers may choose to implement WS' recommendations on their own (i.e., technical assistance), use contractual services of private businesses, use volunteer services of private

organizations, use the services of WS (i.e., direct operational assistance), or take no action. The property owner or manager may choose to apply for their own depredation permit from the USFWS to lethally remove birds, as required by the implementing regulations of the MBTA for depredation control (see 50 CFR 21.41). The USFWS requires non-lethal methods be used and shown ineffective or impractical before the USFWS will issue a depredation permit. In this situation, WS could evaluate the damage and complete a Migratory Bird Damage Report, which would include information on the extent of the damages, the number of birds present, and a recommendation for the number of birds that should be lethally removed to best alleviate the damages.

Following USFWS review of a complete application for a depredation permit from a property owner or manager and the Migratory Bird Damage Report, a depredation permit could be issued to authorize the lethal removal of a specified number of birds as part of an integrated approach. Upon receipt of a depredation permit, the property owner, manager, or appropriate subpermittee may commence the authorized activities and must submit a written report of their activities upon expiration of their permit. Permits may be renewed annually as needed to resolve damage or reduce threats to human safety. Property owners or managers could conduct management using those methods legally available. Most methods discussed in Appendix B that are available for use to manage bird damage would be available to all entities. The only methods currently available that would not be available for use by those persons experiencing bird damage is the avicide DRC-1339 and the immobilizing drug alpha-chloralose which can only be used by WS.

In anticipation of damage management activities, WS would annually submit an application for a depredation permit to the USFWS estimating the maximum number of birds that could be lethally removed to alleviate damage in Ohio through direct operational assistance projects. The number of birds anticipated to be lethally removed by WS would be based on previous requests for assistance received to manage damage associated with those species of birds. Therefore, the USFWS could: 1) deny WS' application for a depredation permit, 2) issue a depredation permit for the removal of birds at a level below the number requested by WS, or 3) issue a depredation permit for the number of birds requested by WS. In addition, WS could be listed as subpermittees under depredation permits issued to other entities.

Non-lethal methods include, but are not limited to, habitat/behavior modification, nest/egg destruction, lure crops, visual deterrents, live traps, translocation, exclusionary devices, frightening devices, alpha-chloralose, reproductive inhibitors, and chemical taste repellents (see Appendix B for a complete list and description of potential methods). Lethal methods considered by WS include live-capture followed by euthanasia, DRC-1339, the recommendation of lethal removal during hunting seasons, and firearms. Wildlife Services would employ cervical dislocation or carbon dioxide to euthanize target birds once those birds were live-captured using other methods. Carbon dioxide is an acceptable form of euthanasia for birds while cervical dislocation is a conditionally acceptable[7] method of euthanasia (AVMA 2013). The use of firearms could also be used to euthanize birds live-captured; however, the use of firearms for euthanasia is considered a conditionally acceptable method for wildlife (AVMA 2013).

Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement effective management methods in a cost-effective manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. Selections are made from an array of management techniques to create a combination of methods for the specific circumstances. Management strategies

[7]The AVMA (2013) defines conditional acceptable as "...[methods] *that by the nature of the technique or because of greater potential for operator error or safety hazards might not consistently produce humane death or are methods not well documented in the scientific literature".*

may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), human behavior management (e.g., feeding bans), animal behavior modification (e.g., scaring), local population reduction, or any combination of these, depending on the characteristics of the specific damage problem.

Damage management strategies generally fall into two categories, preventive management and corrective management. Preventive damage management is the practice of applying wildlife damage management strategies before damage occurs, based on historical problems and the probability of the damage recurring or to reduce the risk that damage or a threat to human or livestock heath may occur. Examples would be applying bird-proof netting over fruit trees before the fruit becomes attractive to birds; removing a bird(s) from a food processing plant, restaurant, industrial plant, or a feedlot before the bird(s) has caused damage or threatened public or livestock health; and work to reduce bird activity at airports. Corrective Damage Management involves applying wildlife damage management methods to stop or reduce ongoing losses. For example, in areas where birds are consuming livestock feed, WS may provide information to the resource owner about exclusionary methods, animal husbandry, mechanical scare devices and pyrotechnics, or aid the landowner in removing the birds causing the damage.

Technical Assistance Recommendations

Technical assistance involves WS personnel providing information, demonstrations, and advice on available and appropriate wildlife damage management methods. Technical assistance includes demonstrations on the proper use of management devices (*i.e.*, propane exploders, exclusionary devices, cage traps, etc.) and information on animal husbandry, habitat management, and animal behavior modification that could reduce damage. It may also include loaning damage management devices (e.g., propane cannons). Technical assistance is usually provided following consultation or an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and practical application. The implementation of damage management actions is the responsibility of the individual(s) requesting assistance.

Operational Damage Management Assistance

Operational damage management assistance includes damage management activities that are conducted by or supervised by WS personnel. Operational damage management assistance is initiated when the problem cannot effectively be resolved through technical assistance, and when *Agreements for Control* or other comparable documents provide for WS operational damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted-use pesticides are proposed, or the problem is complex requiring the direct supervision of wildlife professional.

To address the anticipated needs of property owners/managers with bird damages that may request WS' assistance with lethal methods to alleviate their damages, WS would submit an application for a one-year depredation permit to the USFWS estimating the maximum number of birds of each species to be lethally taken as part of an integrated approach. The USFWS would conduct an independent review of the application, and if acceptable, issue a permit as allowed under the depredation permit regulations. Wildlife Services could request an amendment of their permit to increase the number of birds that could be lethally removed to address unpredicted and emerging bird damages/conflicts. Each year, WS would submit an application for renewal of their permit, and using adaptive management principles, would adjust numbers of birds to meet anticipated needs, based upon management actions in the previous year and anticipated damages and conflicts in the next year. The USFWS would review these applications annually, and issue permits as allowed by regulations. All alterations in the number of birds to be lethally

removed would be checked against the impacts analyzed in this EA. All management actions by WS would comply with appropriate federal, state, and local laws.

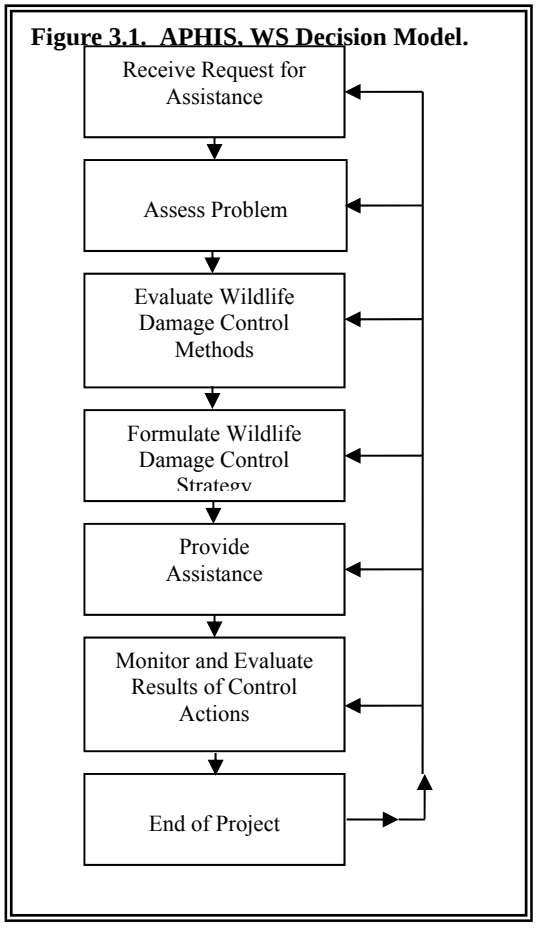
Educational Efforts

Education is an important element of WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. This is extremely challenging as nature has no balance, but rather, is in continual flux. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures, instructional courses, and demonstrations are provided to producers, homeowners, State and county agents, colleges and universities, and other interested groups. Wildlife Services frequently cooperates with other agencies in education and public information efforts. Additionally, technical papers are presented at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

Research and Development

The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. NWRC scientists work closely with wildlife managers, researchers, field specialists and others to develop and evaluate wildlife damage management techniques. NWRC research was instrumental in the development of methyl anthranilate (MA) and Nicarbizin, a reproductive inhibitor for use on Canada Geese and pigeons. In addition, NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

Figure 3.1. APHIS, WS Decision Model.



Wildlife Services Decision Making Procedures

The WS Decision Model[8] process is a procedure for evaluating and responding to damage complaints (Figure 3.1). Wildlife Services personnel evaluate the appropriateness of strategies, and methods are evaluated for their availability (legal and administrative) and suitability based on biological, economic and social considerations. Wildlife Services also considers management alternatives which have already been implemented. Wildlife Services personnel are frequently contacted only after requesters have tried non-lethal methods and found them to be inadequate for reducing damage to an acceptable level. Following this evaluation, the methods deemed to be practical for the situation are

[8] The WS Decision Model is not a written process but a mental problem-solving process common to most, if not all professions to determine appropriate actions to take.

developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results with the damage management strategy.

Community-based Selection of a Bird Damage Management Program

The WS program in Ohio follows the "co-managerial approach" to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS provides technical assistance regarding the biology and ecology of the species involved in the damage and effective, practical, and reasonable methods available to reduce deer damage to local requesters. This includes non-lethal and lethal methods. Wildlife Services and other state and federal wildlife or WDM agencies may facilitate discussions at local community meetings when resources are available. Resource owners/managers and others directly affected by bird damage or conflicts in Ohio have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others on their own, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

By involving decision-makers in the process, damage management actions can be presented to allow decisions to involve those individuals that the decision-maker(s) represents. Requests for assistance to manage birds often originate from the decision-maker(s) based on community feedback or from concerns about damage or threats to human safety. As representatives, the decision-maker(s) are able to provide the information to local interests either through technical assistance provided by WS or through demonstrations and presentations by WS on activities to manage damage. This process allows decisions on activities to be made based on local input.

Alternative 2 – Only Non-lethal Bird Damage Management

Under this alternative, WS would be restricted to only using or recommending non-lethal methods to resolve damage caused by birds in Ohio (Appendix B). Lethal methods could continue to be used under this alternative by those persons experiencing damage without involvement by WS. In situations where non-lethal methods were impractical or ineffective to alleviate damage, WS could refer requests for information regarding lethal methods to the state, local animal control agencies, or private businesses or organizations. Property owners or managers may choose to implement WS' non-lethal recommendations on their own or with the assistance of WS, implement lethal methods on their own, or request assistance (non-lethal or lethal) from a private or public entity other than WS.

Alternative 3 - No WS Bird Damage Management Program

This alternative precludes any activities by WS to reduce threats to human health and safety, and alleviate damage to agricultural resources, property, and natural resources. Wildlife Services would not be involved with any aspect of bird damage management. All requests for assistance received by WS to resolve damage caused by birds would be referred to the USFWS, ODW, and/or private entities. This alternative would not deny other federal, state, and/or local agencies, including private entities from conducting damage management activities directed at alleviating damage and threats associated with birds. Many of the methods listed in Appendix B would be available for use by other agencies and private entities, unless otherwise noted in the Appendix, to manage damage and threats associated with birds.

Under this alternative, property owners/managers may have difficulty obtaining permits to use lethal methods. The USFWS needs professional recommendations on individual damage situations before issuing a depredation permit for lethal removed, and the USFWS does not have the mandate or the resources to conduct damage management activities. State agencies with responsibilities for migratory birds would likely have to provide this information if depredation permits are to be issued.

Despite no involvement by WS in resolving damage and threats associated with birds, those persons experiencing damage caused by birds could continue to resolve damage by employing those methods legally available since the lethal removal of birds could occur either through the issuance of depredation permits by the USFWS; lethal removal during the hunting seasons, and blackbirds could be lethally removed at any time when found committing or about to commit damage or posing a human safety threat under a depredation order. All methods described in Appendix B would be available for use by those persons experiencing damage or threats except for the use of DRC-1339 and Alpha chloralose which are only available for use by WS employees. However, the avian toxicant Starlicide is similar to DRC-1339 and would remain available to licensed pesticide applicators.

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

In addition to those alternatives analyzed in detail, several alternatives were identified by WS and the USFWS; however, those alternatives will not receive detailed analyses in this EA for the reasons provided. Those alternatives considered, but not analyzed in detail include:

Use of Non-lethal Methods before Lethal Methods

This alternative would require that all non-lethal methods or techniques described in Appendix B be applied to all requests for assistance to reduce damage and threats to safety from birds. If the use of all non-lethal methods fails to resolve the damage situation or reduce threats to human safety at each damage situation, lethal methods would be employed to resolve the request. Non-lethal methods would be applied to every request for assistance regardless of severity or intensity of the damage or threat until deemed inadequate to resolve the request. This alternative would not prevent the use of lethal methods by those persons experiencing bird damage.

Those persons experiencing damage often employ non-lethal methods to reduce damage or threats prior to contacting WS. Verification of the methods used would be the responsibility of WS. No standard exists to determine requester diligence in applying those methods, nor are there any standards to determine how many non-lethal applications are necessary before the initiation of lethal methods. Thus, only the presence or absence of non-lethal methods can be evaluated. The proposed action (Alternative 1) is similar to a non-lethal before lethal alternative because the use of non-lethal methods is considered before lethal methods by WS (WS Directive 2.101). Adding a non-lethal before lethal alternative and the associated analysis would not add additional information to the analyses in this EA.

Use of Lethal Methods Only by WS

This alternative would require the use of lethal methods only to reduce threats and damage associated with birds. However, non-lethal methods can be effective in preventing damage in certain instances. Under WS Directive 2.101, WS must consider the use of non-lethal methods before lethal methods. Therefore, this alternative was not considered in detail.

Compensation for Bird Damage

The compensation alternative would require WS to establish a system to reimburse persons impacted by bird damage. Under such an alternative, WS would continue to provide technical assistance to those persons seeking assistance with managing damage. In addition, WS would conduct site visits to verify damage. Analysis of this alternative indicated that a compensation only alternative had many drawbacks. Compensation would: 1) require large expenditures of money and labor to investigate and validate all damage claims, and to determine and administer appropriate compensation, 2) most likely be below full market value, 3) give little incentive to resource owners to limit damage through improved cultural or other practices and management strategies, and 4) not be practical for reducing threats to human health and safety.

Technical Assistance Only

This alternative would restrict WS to only providing technical assistance (advice) on BDM. Producers, property owners, agency personnel, or others could obtain permits from the USFWS and/or the ODW as needed and could conduct bird damage management using any of the legally available non-lethal and lethal techniques. Technical assistance information is also readily available from entities other than WS such as the USFWS, universities, extension agents, FAA, and private individual and organizations. Environmental impacts of this alternative are likely to be similar to Alternative 3. Consequently, the agencies have determined that detailed analysis of this alternative would not contribute substantive new information to the understanding of environmental impacts of damage management alternatives and have chosen to not analyze this alternative in detail.

3.3 STANDARD OPERATING PROCEDURES FOR BIRD DAMAGE MANAGEMENT

SOPs improve the safety, selectivity, and efficacy of those methods available to resolve or prevent damage. The current WS program uses many such SOPs. Those SOPs would be incorporated into activities conducted by WS when addressing bird damage and threats.

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

- The WS Decision Model, which is designed to identify effective wildlife damage management strategies and their impacts, would be consistently used and applied when addressing bird damage.

- EPA-approved label directions would be followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects occur to the environment when chemicals are used in accordance with label directions.

- Material Safety Data Sheets for pesticides would be provided to all WS' personnel involved with specific damage management activities.

- The presence of non-target species would be monitored before using DRC-1339 to reduce the risk of mortality of non-target species' populations.

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

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

- Management actions would be directed toward specific birds posing a threat to human safety, causing agricultural damage, causing damage to natural resources, or causing damage to property.

- The lethal removal of birds would only occur when authorized by the USFWS, when applicable, and only at levels authorized.

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

- Wildlife Services' use of euthanasia methods would comply with WS Directive 2.505.

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

3.4 ADDITIONAL STANDARD OPERATING PROCEDURES SPECIFIC TO THE ISSUES

Issue 1 - Effects of WS Bird Damage Management on Target Species Populations

- Lethal removal of birds by WS would be reported and monitored by WS and by the USFWS to evaluate population trends and the magnitude of WS' lethal removal of birds in the state.

- Wildlife Services would only target those individuals or groups of targets species identified as causing or posing a threat to human safety.

- Wildlife Services would monitor bird damage management activities to ensure activities do not adversely impact bird populations.

- Preference would be given to non-lethal methods, when practical and effective. If practical and effective non-lethal control methods are not available and if lethal control methods are available for WS to implement, WS may implement lethal methods.

- Wildlife Services consulted with the ODW regarding the Raptor Relocation Plan and would continue to abide by all applicable measures identified by both parties within the Plan in order to encourage non-lethal management of raptors when possible.

- Wildlife Services' personnel would be present during the use of most live-capture methods (e.g., mist nets, cannon nets, rocket nets) to ensure birds captured would be addressed in a timely manner to minimize the stress of being restrained.

Issue 2 - Effects of WS Bird Damage Management on Non-target Species Populations, Including Threatened and Endangered (T/E) Species

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

- Wildlife Services personnel would choose bait, trap placement, and capture devices that are most likely to capture a target animal and minimize the potential of non-target animal captures.

- Any non-target animals captured in restraining devices would be released whenever it is possible and safe to do so.

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

- Personnel would be present during the use of live-capture methods, and live traps would be checked frequently to ensure non-target species are released immediately or are prevented from being captured.

- Wildlife Services has consulted with the USFWS and ODW to evaluate activities to resolve bird damage and threats to ensure protection of T&E species.

Issue 3 - Risks Posed by WS Bird Damage Management Methods to Human Health and Safety

- Damage management activities would be conducted professionally and in the safest manner possible. Damage management activities would be conducted away from areas of high human activity. If this were not possible, then activities would be conducted during periods when human activity is low.

- Damage management via shooting would be conducted during times when public activity and access to the control areas are restricted. Personnel involved in shooting operations would be fully trained in the proper and safe application of this method.

- All personnel employing chemical methods would be properly trained and certified in the use of those chemicals. All chemicals used by WS would be securely stored and properly monitored to ensure the safety of the public. Wildlife Services' use of chemicals and training requirements are outlined in WS Directive 2.401.

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

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

- Wildlife Services' employees who use alpha chloralose participate in approved training courses conserving immobilizing drugs. Wildlife Services would not use alpha chloralose during hunting seasons or 30 days prior to hunting seasons.

- Wildlife Services would adhere to all established withdrawal times when using immobilizing drugs for the capture of waterfowl that are agreed upon by WS, the USFWS, ODW, and veterinarian authorities. Although unlikely, in the event that WS is requested to immobilize waterfowl either when waterfowl harvest is occurring or when the withdrawal period could overlap with the start of the harvest season, WS would euthanize the animal.

Issue 4 - Impacts on Aesthetic Value of Birds

- Management actions to reduce or prevent damage caused by birds would be directed toward specific individuals identified as responsible for the damage, identified as posing a threat to human safety, or identified as posing a threat of damage.

- All methods or techniques applied to resolve damage or threats to human safety would be agreed upon by entering into a cooperative service agreement, MOU, or comparable document prior to the implementation of those methods.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative to address the need for action described in Chapter 1 and the issues described in Chapter 2. This chapter analyzes the environmental consequences of each alternative as those alternatives relate to the issues identified. The following resource values in Ohio are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. Those resources will not be analyzed further.

The activities proposed in the alternatives would have a negligible effect on atmospheric conditions including the global climate. Meaningful direct or indirect emissions of greenhouse gases would not occur as a result of any of the proposed alternatives. Those alternatives would meet the requirements of applicable laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

Indirect Effects: These are impacts caused by an action that are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative Effects: Cumulative effects are discussed in relationship to each of the alternatives analyzed, with emphasis on potential cumulative effects from methods employed, and including summary analyses of potential cumulative impacts to target and non-target species, including T&E species.

Irreversible and Irretrievable Commitments of Resources: Other than minor uses of fuels for motor vehicles and other materials, there are no irreversible or irretrievable commitments of resources.

Nest: For the purposes of this document, the definition of a nest is described in the USFWS Migratory Bird Memorandum on Nest Destruction (USFWS 2003b).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

The proposed action/no action alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The analysis also takes into consideration mandates, directives, and the procedures of WS, the USFWS, and the ODW.

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

Alternative 1 – Continue the Current WS Adaptive Integrated Bird Damage Management Program (No Action/Proposed Action)

Under the proposed action, WS would continue to provide both technical assistance and direct operational assistance using methods described in Appendix B to those persons requesting assistance with managing damage and threats associated with birds. Wildlife Services' lethal removal is monitored by comparing numbers of animals killed with overall populations or trends in populations to assure the magnitude of lethal removal is maintained below the level that would cause significant adverse impacts to the viability of native species' populations. The potential impacts on the populations of target bird species from the implementation of the proposed action are analyzed for each species below. Unless noted otherwise, the state population estimate listed for each species analyzed below was obtained from PFSC (2013). Breeding Bird Survey (BBS) population trends from 1966 to 2012 for Ohio and the region that the state falls within (Eastern) are listed for each species when available (Sauer et al. 2014). The statistical significance of a trend for a given species that is determined by the BBS data is color coded: a black

percentage indicates a statistically non-significant positive or negative trend, a red percentage indicates a statistically significant negative trend, and a blue percentage indicates a statistically significant positive trend (Sauer et al. 2014).

European Starling Biology and Population Impacts

OH population estimate: 2,600,000
BBS East, 1966-2012: -1.30%
BBS East, 2002-2012: -1.07%
WS removal as % of state population: 3.85%

WS proposed removal: 100,000
BBS OH, 1966-2012: -0.56%
BBS OH, 2002-2012: -0.78%

Starlings were introduced into North America in 1890-91 when about 80 pairs were released into New York City's Central Park (Bump and Robbins 1966). In just 100 years, starlings have colonized the United States and expanded into Canada and Mexico and have become one of the most common birds in North America (Feare 1984).

European starlings are considered a non-native species in Ohio and are afforded no protection under the MBTA. Therefore, no depredation permits, from either the USFWS or the ODW, are needed for the removal of starlings. The number of starlings lethally removed to alleviate damage or threats is unknown since the reporting of starling removal is not required. The number of starlings dispersed and lethally removed by WS from FY 2011 through FY 2013 can be seen in Table 4.2. Executive Order 13112 states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law; 1) reduce invasion of exotic species and associated damages, 2) monitor invasive species populations, provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species.

Table 4.1. Starling management by method FY2011, 2012, 2013.

Year	**Management Method**			
	Harassment	Firearms	Traps	DRC 1339
FY11	2,003,115	2,460	4,164	20,435
FY12	900,815	2,085	11,306	0
FY13	1,040,625	2,940	4,473	5,500
Average	1,314,852	2,495	6,648	8,645

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on European starling populations. While non-WS removal is unknown, starling populations have remained relatively stable and have historically expanded their range throughout North America. Additionally, starling populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to starling populations.

Blackbird Biology and Population Impacts

The blackbird group in North America includes ten species of birds (Dolbeer 1994) including some of the most prolific and abundant birds in North America (Dolbeer and Stehn 1983). Of those ten species, American crows, red-winged blackbirds, brown-headed cowbirds, and common grackles are the species most commonly involved with causing damage or posing threats of damage in Ohio. The USFWS has established a Federal Depredation Order (50 CFR 21.43) for blackbirds (Sobeck 2010). Therefore, no

federal permit is required to remove blackbirds, cowbirds, grackles, crows and magpies if they are 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. The USFWS could impose restrictions on depredation harvest as needed to assure cumulative lethal removal does not adversely affect the continued viability of crow populations, which should also assure that cumulative impacts on crow populations would have no significant impact on the quality of the human environment.

Red-winged Blackbird Biology and Population Impacts

OH population estimate: 2,500,000
BBS East, 1966-2012: -1.61%
BBS East, 2002-2012: -2.00%
WS removal as % of state population: 0.2%

WS proposed removal: 5,000
BBS OH, 1966-2012: -2.39%
BBS OH, 2002-2012: -3.15%

Found in Ohio year-round, red-winged blackbirds rank among our most numerous breeding birds (Peterjohn 2001). The breeding habitat of red-winged blackbirds includes marshes and upland habitats from southern Alaska and Canada southward to Costa Rica extending from the Pacific to the Atlantic Coast along with the Caribbean Islands (Yasukawa and Searcy 1995). Primarily associated with emergent vegetation in freshwater wetlands and upland habitats during the breeding season, red-winged blackbirds also nest in marsh vegetation in roadside ditches, saltwater marshes, rice paddies, hay fields, pasture land, fallow fields, suburban habitats, and urban parks (Yasukawa and Searcy 1995). Red-winged blackbirds have shown a stable trend since 1966 during the Christmas Bird Count with a slight increase in observations over the past ten years (NAS 2010).

Table 4.2. Red-winged blackbird management by method FY2011, 2012, 2013.

Year	**Management Method**		
	Harassment	Firearms	Traps
FY11	73,169	365	322
FY12	24,521	245	235
FY13	82,644	558	60
Average	60,111	389	206

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on red-winged blackbird populations. While non-WS removal is unknown, blackbird populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to red-winged blackbird populations. Additionally, the USFWS could impose restrictions on depredation harvest as needed to assure cumulative removal does not adversely affect the continued viability of blackbird populations, which should also assure that cumulative impacts on blackbird populations would have no significant impact on the quality of the human environment.

Common Grackle Biology and Population Impacts

OH population estimate: 2,600,000
BBS East, 1966-2012: -2.00%
BBS East, 2002-2012: -2.53%
WS removal as % of state population: 0.19%

WS proposed removal: 5,000
BBS OH, 1966-2012: -0.38%
BBS OH, 2002-2012: -1.26%

Another blackbird species commonly found in mixed species flocks is the common grackle. Common grackles are a semi-colonial nesting species often associated with human activities (Peer and Bollinger 1997). Common grackles have likely benefited from human activities, such as the clearing of forests in the eastern United States which provides suitable nesting habitat and the planting of trees in residential areas which has led to an expansion of the species' range into the western United States (Peer and Bollinger 1997).

Table 4.3. Common grackle management by method FY2011, 2012, 2013.

Year	Management Method		
	Harassment	Firearms	Traps
FY11	50	3	0
FY12	0	0	0
FY13	0	0	0
Average	17	1	0

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on common grackle populations. While non-WS removal is unknown, blackbird populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to grackle populations. Additionally, the USFWS could impose restrictions on depredation harvest as needed to assure cumulative removal does not adversely affect the continued viability of grackle populations, which should also assure that cumulative impacts on grackle populations would have no significant impact on the quality of the human environment.

Brown-headed Cowbird Biology and Population Impacts

OH population estimate: 1,100,000
BBS East, 1966-2012: -1.66%
BBS East, 2002-2012: -0.43%
WS removal as % of state population: 0.91%
WS proposed removal: 10,000
BBS OH, 1966-2012: -0.50%
BBS OH, 2002-2012: -0.23%

Brown-headed cowbirds are another species of the blackbird family commonly found in mixed species flocks during migration periods. Brown-headed cowbirds are common summer residents in a variety of habitats including woodlands, farmlands, and urban areas (Peterjohn 2001). Somewhat unique in their breeding habits, cowbirds are known as brood parasites meaning they lay their eggs in the nests of other bird species (Lowther 1993). Female cowbirds can lay up to 40 eggs per season with eggs reportedly being laid in the nests of over 220 species of birds, of which, 144 species have actually raised cowbird young (Lowther 1993).

Table 4.4. Brown-headed cowbird management by method FY2011, 2012, 2013.

Year	Management Method		
	Harassment	Firearms	Traps
FY11	2,574	160	109
FY12	1,100	118	110
FY13	703	45	11
Average	1,459	108	77

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on cowbird populations. While non-WS removal is unknown, cowbird populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to cowbird populations. Additionally, the USFWS could impose restrictions on depredation harvest as needed to assure cumulative removal does not adversely affect the continued viability of cowbird populations, which should also assure that cumulative impacts on crow populations would have no significant impact on the quality of the human environment.

American Crow Biology and Population Impacts

OH population estimate: 400,000
BBS East, 1966-2012: 0.56%
BBS East, 2002-2012: 0.36%
WS removal as % of state population: 0.13%

WS proposed removal: 500
BBS OH, 1966-2012: 0.72%
BBS OH, 2002-2012: -0.25%

American crows are distributed north to south from the Yukon Territory, Canada, to Baja, California and Gulf of Mexico, and are found from the west coast to the east coast (Johnston 1961). American crows can be found throughout the year in Ohio. From their spring nesting colonies, or autumn and winter roosts, they forage for insects, grain, and carrion. Johnston (1961) reports that crows reach their peak abundance in agricultural areas where there are wooded areas, and have increased in numbers where agricultural practices have increased. American crows are considered a migratory game bird in Ohio, and can be killed during their hunting season. In addition, crow populations are healthy enough, and the problems they cause great enough, that the USFWS has established a standing depredation order for use by the public.

Table 4.5. American crow management by method FY2011, 2012, 2013.

Year	**Management Method**		
	Harassment	Firearms	Traps
FY11	13,288	15	0
FY12	7,976	4	0
FY13	6,363	22	0
Average	9,209	14	0

Direct, Indirect, and Cumulative Effects:
Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on crow populations. While non-WS removal is unknown, crow populations have remained abundant enough that the USFWS has maintained the Federal Blackbird Depredation Order. Therefore, WS does not anticipate any significant cumulative impacts to crow populations. Additionally, the USFWS could impose restrictions on depredation harvest as needed to assure cumulative removal does not adversely affect the continued viability of crow populations, which should also assure that cumulative impacts on crow populations would have no significant impact on the quality of the human environment. Wildlife Services also does not expect crow populations to be impacted enough to limit the ability of those persons interested in harvesting crows during the regulated hunting season.

Horned Lark Biology and Population Impacts

OH population estimate: 700,000
BBS East, 1966-2012: -2.86%
BBS East, 2002-2012: -2.38%
WS removal as % of state population: 0.01%

WS proposed removal: 100
BBS OH, 1966-2012: -1.17%
BBS OH, 2002-2012: -1.01%

Horned larks inhabit primarily open ground such as fields, tundra, prairies, and airports. This lark is found year-round throughout much of the continental U.S., including Ohio (Peterson 2002).

Direct, Indirect, and Cumulative Effects:
Although the horned lark population trend has been declining since 1966, WS proposed removal is only a fraction of a percent of the state population. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on lark populations. Between 2011-2013, the USFWS reported no take by any entities of horned larks. The historical removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for horned larks in Ohio.

House Sparrow Biology and Population Impacts

OH population estimate: 3,400,000
BBS East, 1966-2012: -3.74%
BBS East, 2002-2012: -3.41%
WS removal as % of state population: 0.03%

WS proposed removal: 1,000
BBS OH, 1966-2012: -2.74%
BBS OH, 2002-2012: -2.39%

House sparrows or English sparrows were introduced to North America from England in 1850 and have spread throughout the continent (Fitzwater 1994). The species is not protected by federal or state laws. Like European starlings and rock pigeons, house sparrows are considered by many wildlife biologists, ornithologists and naturalists to be an undesirable component of North American native ecosystems. House sparrows are found in nearly every habitat except dense forest, alpine, and desert environments. It prefers human-altered habitats, and is abundant on farms, in cities and suburbs (Robbins et al. 1997).

Direct, Indirect, and Cumulative Effects:
Wildlife Services' removal of house sparrows to reduce damage and threats would be in compliance with Executive Order 13112. Wildlife Services' proposed removal is only a fraction of a percent of the statewide population and therefore will have no adverse direct or indirect effects on sparrow populations. Although non-WS removal is unknown, house sparrow populations have historically expanded their range throughout North America. Therefore, WS does not anticipate any significant cumulative impacts to sparrow populations.

Barn Swallow Biology and Population Impact

OH population estimate: 610,000
BBS East, 1966-2012: -1.56%
BBS East, 2002-2012: -0.22%
WS removal as % of state population: 0.03%

WS proposed removal: 200
BBS OH, 1966-2012: 0.64%
BBS OH, 2002-2012: 1.46%

Barn swallows are found throughout Ohio. They are common in open rural areas within the state and are known to nest in barns and other building, under bridges, in culverts, and along the entrance of caves (Buckelew Jr. and Hall 1994).

Direct, Indirect, and Cumulative Effects:
Although the regional barn swallow population trend has been declining since 1966, Ohio populations appear to be on the rise. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on swallow populations. Between 2011-2013, the USFWS reported only two barn swallows taken by all entities. The historical removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for barn swallows in Ohio.

Tree Swallow Biology and Population Impact

OH population estimate: 110,000
BBS East, 1966-2012: -1.70%
BBS East, 2002-2012: -0.42%
WS removal as % of state population: 0.18%
WS proposed removal: 200
BBS OH, 1966-2012: 7.74%
BBS OH, 2002-2012: 5.70%

Tree swallows are cavity nesters, and look for holes in trees, snags, and commonly can be found in birdhouses such as bluebird houses. Wintering from the southern U.S. fringe to South America, and spending its summers from central and northern U.S. to Canada and Alaska, the tree swallow is a migrator and strong flier (Peterson 2002).

Direct, Indirect, and Cumulative Effects:
Although the regional tree swallow population trend has been declining since 1966, Ohio populations appear to be on the rise. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on swallow populations. Between 2011-2013, the USFWS reported no take by any entities of horned larks. The historical removal from all non-WS entities combined with WS proposed removal is also only a fraction of a percent of the state population and therefore it is not expected to create adverse cumulative impacts. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for tree swallows in Ohio.

Wild Turkey Biology and Population Impacts

OH population estimate: 180,000 [1]
BBS East, 1966-2012: 10.50%
BBS East, 2002-2012: 10.78%
WS removal as % of state population: 0.03%
Cumulative removal as % of state population: 10%
WS proposed removal: 50
BBS OH, 1966-2012: 10.64%
BBS OH, 2002-2012: 11.21%
[1]ODW 2014c

The Eastern wild turkey is the most widely distributed, abundant and hunted turkey subspecies of the five distinct subspecies found in the United States. It inhabits roughly the eastern half of the country. The Eastern wild turkey is found in the hardwood and mixed forests from New England and southern Canada to northern Florida and west to Texas, Missouri, Iowa and Minnesota. They are considered weak fliers and are non-migratory; they forage on acorns, fruit, seeds and insects.

Turkeys are a game species in Ohio and has a regulated hunting season with about 18,409 turkeys killed during the 2013 spring hunting season (ODWb 2014). Ohio WS did not kill any wild turkeys during FY11 through FY13; however, 85 turkeys were harassed.

Direct, Indirect, and Cumulative Effects:
Both regional and Ohio populations have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on turkey populations. The number of turkeys proposed for lethal removal by WS is 0.27% of the number of turkeys harvested by hunters in the 2013 spring hunting season. Based on the best scientific data, WS' proposed removal level is expected to have no adverse direct or indirect adverse effects on turkey populations or the opportunity for sportsmen to harvest turkeys. The permitting of the removal by the ODW pursuant to state regulations ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for wild turkey in Ohio.

Gull Biology and Population Impact

In addition to increases in gull populations in natural habitats, there has been an increase in populations in urban areas where gulls have established colonies on buildings (Dolbeer et al. 1990). Dwyer et al. (1996) documented 7,922 pairs of roof-nesting gulls at 30 colonies in four Great Lakes states, including Ohio with 17 colonies and Illinois with eight colonies. The growth in these populations has been dramatic, for example, in Cuyahoga County, Ohio, there were three roof-nesting colonies with 265 pairs in 1990 and more that 2,549 breeding pairs in 13 colonies in 1994 (Dwyer et al. 1996).

Herring Gull Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: -3.04%
BBS East, 2002-2012: -1.53%
WS removal as % of state population: NA

WS proposed removal: 1,000 gulls, 10,000 nests
BBS OH, 1966-2012: -2.20%
BBS OH, 2002-2012: -0.99%

Herring gulls can be found near garbage dumps and near lakes and rivers. In addition they often occur on airport facilities and cause risk to the travelling public and aircraft from bird strikes and damage other resources such as moored boats at marinas.

Table 4.6. Number of herring gulls addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	72,674	31	99
2012	11,313	7	76
2013	93,300	81	238
Average	**59,096**	**40**	**138**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Both regional and Ohio trends have been declining since 1966, however, the rate of decline has decreased since 2002. As a colonial species, herring gulls can be locally abundant at areas such as garbage dumps and near water sources. Management of this species is typically conducted in Ohio at waste management facilities and airports to protect human health and safety. While there is no estimated population available for Ohio, the relatively low lethal removal of WS and of other entities compared to the number of birds harassed each year indicates that the proposed lethal removal will not have adverse direct or indirect effects on herring gull populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for herring gulls in Ohio.

Ring-billed Gull Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: 4.36%
BBS East, 2002-2012: 8.19%
WS removal as % of state population: NA

WS proposed removal: 5,000 gulls, 30,000 nests
BBS OH, 1966-2012: 0.27%
BBS OH, 2002-2012: -1.39%

Ring-billed gulls are a common gull in Ohio and populations are concentrated near lakes, reservoirs, and other large bodies of water. Like most gulls, ring-billed gulls are omnivorous, feeding on animal and plant matter. Common feeding sites are open refuse dumps, livestock feedlots, fish hatcheries, open fields and food processing plants, parks, and sites with outdoor restaurants. Spring arrival of migrants in Ohio begins in March/April and autumn migration is normally completed in October, however, some ring-billed gulls may remain longer. Ring-billed gulls are long lived birds. They attain sexual maturity in 2-3 years. USGS records indicate the oldest band record for a ring-billed gull is 27 years, 3 months but the average ring-billed gull lifespan is 10-15 years (Ryder 1993).

Table 4.7. Number of ring-billed gulls addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	659,989	209	376
2012	188,059	172	252
2013	999,755	206	252
Average	**615,934**	**196**	**293**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Regional trends for ring-billed gulls have been increasing since 1966. Ohio trends also show increases since 1966, although there is a decreasing trend since 2002. There is no estimated population available for Ohio; however, BBS trends indicate increasing regional populations. Ring-billed gull management is typically localized at specific locations such as an airport or landfill. This indicates that WS' management will have no adverse direct or indirect effects on ring-billed gull populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for ring-billed gulls in Ohio.

Bonaparte's Gull Biology and Population Impacts

WS proposed removal: 100

This gull migrates through Ohio to and from its wintering grounds, commonly posing strike hazards on airports near bodies of water. With several airports in Ohio on or near Lake Erie, the Bonaparte's gull has been a hazard in the past and is expected to continue to be into the future. BBS population trend data for Bonaparte's gull is not available; however, the Audubon CBC shows a slightly decreasing population from 2002 to 2013 (NAS 2010).

Table 4.8. Number of Bonaparte's gulls addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	495	0	2
2012	7,329	0	11
2013	18,441	13	6
Average	**8,755**	**4**	**6**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
There is not a population estimate or trend available for this species. CBC data indicates a slight decrease of this species in Ohio. However, since management of Bonaparte's gulls is usually localized to airports. In addition, very few individuals have been lethally removed by WS or by other entities as indicated in Table 4.7. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Bonaparte's gulls.

Killdeer Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: -1.56%
BBS East, 2002-2012: -0.62%
WS proposed removal: 300
BBS OH, 1966-2012: 1.45%
BBS OH, 2002-2012: 2.06%

Killdeer occur over much of North America and a fraction of South America; from the Gulf of Alaska coastline the range extends southward throughout the United States and reaches the Atlantic and Pacific coasts (Hayman et. al. 1986). Killdeer are technically in the family of shorebirds, they are unusual shorebirds in that they often nest and live far from water. Killdeer are commonly found in a variety of open areas, even concrete or asphalt parking lots at shopping malls, as well as fields and beaches, ponds, lakes, road-side ditches, mudflats, airports, pastures, and gravel roads and levees but are seldom seen in large flocks. Killdeer appear in the Midwest in about February. It's also one of the last migrants to leave in the fall, remaining into November.

Table 4.9. Number of killdeer addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	627	23	77
2012	366	41	101
2013	724	36	97
Average	**572**	**33**	**92**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Although the regional killdeer population trend has been declining since 1966, Ohio populations appear to be on the rise. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on killdeer populations. Most WS' lethal removal of this species will be localized to airports. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures

removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for killdeer in Ohio.

Great Blue Heron Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: 0.29%
BBS East, 2002-2012: 1.35%

WS proposed removal: 100
BBS OH, 1966-2012: 1.72%
BBS OH, 2002-2012: 1.05%

Great blue herons are the most widely distributed heron in the United States and are commonly seen in Ohio during the spring, summer, and autumn. Herons feed on fish and other aquatic vertebrates and are commonly viewed standing or wading on the shores of ponds, creeks, and rivers.

Table 4.10. Number of great blue herons addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	321	10	207
2012	554	11	201
2013	723	18	155
Average	**533**	**13**	**188**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Both regional and Ohio great blue heron population trends have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on great blue heron populations. Lethal removal by WS' is a very small fraction of the historical removal from all entities in Ohio. Most WS' removal would be localized to airports and fisheries and this removal is not expected to have a cumulative effect on great blue heron populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for killdeer in Ohio.

Mute Swan Biology and Population Impacts

WS proposed removal: 1,000
BBS East, 1966-2012: 3.71
BBS East, 2002-2012: 5.94

The mute swan was introduced from Europe into the United States in the late 19th century near New York City. Feral breeding took place after 544 more individuals were introduced in the lower Hudson Valley in 1910 and on Long Island in 1912. In the eastern United States, scattered breeding now occurs from Massachusetts to Virginia (Master 1992). Feral populations became established over time as swans that had escaped or been intentionally released from captivity survived and reproduced in the wild. Mute swans prefer freshwater ponds and streams of 10 acres or less and coastal bays and salt marshes. The swan's diet consists mostly of rooted submerged aquatic vegetation. Small islands, narrow peninsulas, and clumps of aquatic vegetation are preferred nesting sites. Nesting territories vary in size from 4 to 10 acres and are sometimes used year-around or reoccupied each year. The mute swan lays the largest of all swan eggs, and a typical clutch of four to eight eggs takes 35 to 38 days to hatch.

Direct, Indirect, and Cumulative Effects:
Mute swans are exotic species and not protected under the MBTA. The ODW is seeking to control mute swan populations because they compete with native species for habitat. The ODW swan management plan calls for a dramatic enhanced effort to control feral populations of mute swans (ODW 2010). Wildlife Services' removal of mute swans would be in compliance with Executive Order 13112. Michigan, which is a part of the Mississippi Flyway along with Ohio, estimates its mute swan population at 15,000 birds. If this number were used as the minimum population estimate for the Flyway, natural resource agencies would need to remove a minimum of 11,000 birds to meet the Flyway's goal of 4,000 swans by 2030 (Mississippi Flyway Council, 2012). Wildlife Services' proposed removal would represent on 6.7% of this minimum population estimate. However, the Flyway population is likely much higher as the previous estimate only encompasses one state. Although non-WS removal is unknown, mute swan populations have historically expanded their range throughout North America (NAS 2010). Therefore, WS does not anticipate any significant cumulative impacts to mute swan populations.

Canada Goose Biology and Population Impacts

OH population estimate: 102,411
BBS East, 1966-2012: 12.85%
BBS East, 2002-2012: 11.95%
WS proposed removal: 2,000 birds, 500 nests
BBS OH, 1966-2012: 13.91%
BBS OH, 2002-2012: 6.41%
WS removal as % of state resident goose population: 1.9%
Cumulative removal as % of state population: 2.2%

Canada geese are probably more abundant now than at any time in history. They rank first among wildlife watchers and second among harvests of waterfowl species in North America (Rusch et al 1995). Canada geese are also the most widely distributed and phenotypically (visible characteristics of the birds) variable species of bird in North America (Rusch et al 1995). Breeding populations now exist in every province and territory of Canada and in 49 of the 50 United States.

Populations in rural and urban settings slowly grew through time, with urban populations growing at a faster rate than those nesting in the rural areas. These locally breeding, resident Canada geese are defined as those Canada geese that nest and reside predominantly within the conterminous United States (Rusch et al. 1995, Ankney 1996, and Grandy and Hadidian 1997), and are designated as giants by Mississippi Flyway Technical Section, Mississippi Flyway Giant Canada Goose Management Plan (1996).

Table 4.11. Number of Canada geese addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		Hunter Harvest
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]	
2011	5,915	130	282	111,600[3]
2012	2,805	130	317	59,400[3]
2013	2,018	94	220	128,500[4]
Average	**3,579**	**118**	**273**	**99,833**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year
[3]Estimates from Raftovich and Wilkins (2013)
[4]Estimates from Raftovich et al. (2014)

Direct, Indirect, and Cumulative Effects:
Both regional and Ohio populations have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on Canada goose populations. The number of geese proposed for lethal removal by WS is 2.0% of the state 2010 population estimate. In addition, the level of removal proposed by WS would be 1.6% of the geese lethally removed by

licensed hunters in Ohio during the 2013 hunting season. Therefore, WS does not anticipate significantly impacting the opportunity for sportsmen to harvest geese.

Because of the labor and costs of implementing programs to reduce reproduction in geese (egg oiling/addling/destruction, and the reproductive inhibitor nicarbazin), widespread use of these methods is unlikely. In the case of nicarbazin[9], use of the product is also restricted to urban areas. Consequently, impacts of these methods on goose populations will likely be limited to local populations. Given the long lifespan of geese, exclusive use of these methods would take years to reduce a local goose population. The greatest value of this product may be in maintaining goose populations at manageable levels. These methods are not anticipated to result in the eradication of local goose populations where they are applied. Consequently, use of these methods is anticipated to have a low magnitude of impact on the state Canada goose population.

Based on the best scientific data, WS' proposed removal level is expected to have no adverse direct or indirect adverse effects on turkey populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Canada geese in Ohio.

Mallard Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: -1.16%
BBS East, 2002-2012: -0.34%

WS proposed removal: 1,000 birds, 300 nests
BBS OH, 1966-2012: 2.00%
BBS OH, 2002-2012: 0.46%

The mallard is the world's most familiar duck (Gooders and Boyer 1986) and is the most adaptable, occupying a wide range of habitats. Clutch sizes vary from 10-12 eggs and incubation takes about 28 days. One of the mallard's foraging characteristics is its ability to utilize agricultural grain crops as well as natural aquatic foods (Johnsgard 1975). Mallard production depends upon water conditions; when water is abundant, production is good and poor production is expected when water is scarce. Other factors that may influence mallard population trends are predation and limited nesting habitat. In the traditional and eastern survey routes of the Waterfowl Breeding Population and Habitat Survey 2013 data indicate that mallard abundance was 40% higher and similar (respectively) to the long-term population average (USFWS 2013).

Table 4.12. Number of mallards addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		Hunter Harvest
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]	
2011	8,818	73	87	52,038[3]
2012	9,516	55	46	44,567[3]
2013	16,050	85	65	104,630[4]
Average	**11,641**	**71**	**66**	**67,079**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year
[3]Estimates from Raftovich and Wilkins (2013)
[4]Estimates from Raftovich et al. (2014)

[9]Nicarbazin is not currently available for use in Ohio (Section 4.1.3). It has been included in this analysis because legal status of the product could change.

Direct, Indirect, and Cumulative Effects:
Although the regional mallard population trend has been declining since 1966, Ohio populations appear to be on the rise as well as across the country. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on mallard populations. The proposed level of lethal removal by WS would be 0.9% of the 2013 mallard hunter harvest. Therefore, WS does not anticipate significantly impacting the opportunity for sportsmen to harvest mallards. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA and hunting regulations ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for mallards in Ohio.

Mourning Dove Biology and Population Impacts

OH population estimate: 1,800,000
BBS East, 1966-2012: 0.50%
BBS East, 2002-2012: 0.35%
WS removal as % of state population: 0.06%
Cumulative removal as % of state population: 13%

WS proposed removal: 1,000 birds
BBS OH, 1966-2012: 1.18%
BBS OH, 2002-2012: 0.87%

Mourning doves are migratory bird with substantial populations throughout much of North America and are the most common native dove found in suburban and farmland areas and is the most widely hunted and harvested game bird. This dove is most common throughout the Great Plains in the Midwest. Mourning doves are one of Ohio's most widespread breeding bird species. They can be found on telephone wires and trees in most neighborhoods throughout the state as well as agricultural areas, especially in early to mid-fall. They are capable of multiple brooding and their range is expanding northward (Ehrlich et al. 1988). After its prolonged breeding season, most congregate in large flocks particularly around agricultural fields (Walsh et al. 1999). They are seed eating birds and many states have regulated annual hunting seasons for this species, including Ohio, with liberal harvest limits.

Table 4.13. Number of mourning doves addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		Hunter Harvest
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]	
2011	4,118	91	165	174,900 (±29%)[3]
2012	1,698	110	139	136,000 (±33%)[3]
2013	1,166	140	238	371,600 (±29%)[4]
Average	**2,327**	**114**	**181**	**227,500**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year
[3]Estimates from Raftovich and Wilkins (2013)
[4]Estimates from Raftovich et al. (2014)

Direct, Indirect, and Cumulative Effects:
Both regional and Ohio populations have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on mourning dove populations. The number of doves proposed for lethal removal by WS is 0.27% of the estimated 2013 mourning dove harvest in Ohio. Therefore, WS does not anticipate significantly impacting the opportunity for sportsmen to harvest doves. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA and hunting regulations ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for mourning doves in Ohio.

Rock Pigeon Biology and Population Impacts

OH population estimate: 300,000
BBS East, 1966-2012: -1.30%
BBS East, 2002-2012: -0.21%
WS removal as % of state population: 0.1%

WS proposed removal: 3,000
BBS OH, 1966-2012: -2.95%
BBS OH, 2002-2012: -2.69%

Rock pigeons are an invasive, non-native species. It is found throughout the United States often seen in large flocks in urban areas. They have adapted well to living in man-made environments and roost on ledges in in buildings if they can gain entrance. From FY11 through FY13, WS dispersed 10,455 and lethally removed 962 rock pigeons to reduce property damages and to address human health and safety concerns related to these birds. Permits are not required for the lethal removal of this species, so no information is available on rock pigeon lethal removal by non-WS entities.

Direct, Indirect, and Cumulative Effects:
Wildlife Services' removal of rock pigeons to reduce damage and threats would be in compliance with Executive Order 13112. Wildlife Services' proposed removal is only a fraction of a percent of the statewide population and therefore will have no adverse direct or indirect effects on pigeon populations. Although non-WS removal is unknown, rock pigeon populations have historically expanded their range throughout North America. Therefore, WS does not anticipate any significant cumulative impacts to pigeon populations.

Raptor Biology and Population Impacts

Raptor work, particularly relocation will follow the *Raptor Relocation Plan 2009* (revised July 2013) put into place by WS and ODW. Wildlife Services will abide by the goals set forth within the plan and use non-lethal methods whenever possible. It will be understood, however, that if non-lethal methods are exhausted, in certain situations, particularly airports and human health and safety, lethal methods may need to be utilized. The live-capture and translocation of raptors to appropriate habitat would not adversely affect populations since the birds would be unharmed. Trapped birds would be banded; banding would occur pursuant to a banding permit issued by the United States Geological Survey. Fair et al. (2010) stated "[w]*hen appropriate* [leg] *band sizes are used, the occurrence and rate of adverse effects on the subjects is ordinarily very low.*" Therefore, WS does not expect the use of appropriately sized leg bands to adversely affect raptors.

American Kestrel Biology and Population Impacts

OH population estimate: 27,000
BBS East, 1966-2012: -2.10%
BBS East, 2002-2012: -1.37%
WS removal as % of state population: 0.74%
Cumulative removal as % of state population: 0.82%

WS proposed removal: 200
BBS OH, 1966-2012: -0.73%
BBS OH, 2002-2012: -2.30%

American kestrels are the smallest and most common falcon in open and semi-open country. It commonly uses telephone poles or wires as hunting perches and is often mistaken for a songbird. Their breeding range extends as far north as central and western Alaska across northern Canada to Nova Scotia, and extends south throughout North America, into central Mexico, the Baja, and the Caribbean. They are local breeders in Central America and are widely distributed throughout South America. Most of the birds breeding in Canada and the northern United States migrate south in the winter, although some males stay as year round residents.

Kestrels consume primarily insects in the summer; however, they will also eat small rodents and birds. Wintering birds feed primarily on rodents and birds. It is possible that the use of pesticides has had an effect on them in recent decades. An even greater problem may be a scarcity of nest sites. As a secondary cavity nester, the kestrel requires an abandoned woodpecker hole or similar cavity to nest and must often compete with starlings, an aggressive, invasive, secondary cavity nester.

Table 4.14. Number of American kestrels addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		
		WS' Relocation[1]	WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	75	18	6	28
2012	130	52	18	50
2013	99	37	7	15
Average	**101**	**36**	**10**	**31**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Although both the regional and Ohio kestrel population trends have been declining since 1966, WS Biologists at airports see this species frequently. Most of WS' management of kestrels is performed on airports to protect human health and safety. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move kestrels when appropriate and safe. If kestrels are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 300 kestrels and lethally removing up to 200. Wildlife Services' proposed removal level will have no adverse direct or indirect effects on kestrel populations based on the best available data. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for kestrels in Ohio.

Sharp-shinned Hawk Biology and Population Impacts

OH population estimate: 3,000
BBS East, 1966-2012: 1.50%
BBS East, 2002-2012: 2.60%
WS removal as % of state population: 1.67%
WS proposed removal: 50
BBS OH, 1966-2012: 0.45%
BBS OH, 2002-2012: 2.29%

The sharp-shinned hawk is a woodland species that ranges from southern Canada to the southern United States. Wildlife Services dispersed two sharp-shinned hawks between FY11 and FY13. No sharp-shinned hawks were lethally removed or relocated by WS during this period. In addition, the USFWS did not report any lethal removal of sharp-shinned hawks by any entity between 2011-2013. There has been little management of sharp-shinned hawks by WS in Ohio. However, this species has the potential to be a strike hazard at airports.

Both the regional and Ohio sharp-shinned hawk population trends have been increasing since 1966. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move hawks when appropriate and safe. If hawks are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 75 sharp-shinned hawks and lethally removing up to 50. Wildlife Services' proposed removal level will have no adverse direct or indirect effects on sharp-shinned hawk populations based on the best available data. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for sharp-shinned hawks in Ohio.

Cooper's Hawk Biology and Population impacts

OH population estimate: 30,000
BBS East, 1966-2012: 3.83%
BBS East, 2002-2012: 5.33%
WS removal as % of state population: 0.17%
Cumulative removal as % of state population: 0.17%

WS proposed removal: 50
BBS OH, 1966-2012: 4.07%
BBS OH, 2002-2012: 3.32%

The Cooper's hawk is a strictly North American species. It is essentially a woodland species and although a true forest hawk, it has adapted remarkably well to life in and around the older suburbs, especially in areas where small woodlots and trees have been allowed to stand. Although it occasionally captures small rodents, especially chipmunks, it has evolved to prey upon smaller birds; it is more of a specialist in the pursuit of medium-sized birds, like mourning doves, Northern flickers (*Colaptes auratus*), American robins (*Turdus migratorius)* and other similarly sized birds.

Nesting often occurs in man-made open clearings. Wintering habitats are similar to nesting habitats and birds are less prone to migrate than sharp-shinned hawks. Home range of these hawks is relatively large. Because of large home range, densities are quite low and 80% of prey are other avian species. Stick nests are placed in trees with overhead cover with clutch size from three to six eggs.

Table 4.15. Number of Cooper's hawks addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		
		WS' Relocation[1]	WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	5	0	0	0
2012	12	6	0	0
2013	34	11	2	1
Average	**17**	**6**	**1**	**0**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Both the regional and Ohio Cooper's hawk population trends have been increasing since 1966. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move hawks when appropriate and safe. If hawks are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 100 Cooper's hawks and lethally removing up to 50. Wildlife Services' proposed removal level will have no adverse direct or indirect effects on Cooper's hawk populations based on the best available data. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Cooper's hawks in Ohio.

Red-shouldered Hawk Biology and Population Impacts

OH population estimate: 9,000
BBS East, 1966-2012: 2.80%
BBS East, 2002-2012: 3.27%
WS removal as % of state population: 0.56%
Cumulative removal as % of state population: 0.57%

WS proposed removal: 50 birds, 25 nests
BBS OH, 1966-2012: 6.36%
BBS OH, 2002-2012: 11.38%

Red-shouldered hawks range throughout the eastern half of the United States and California (National Geographic 1999). It nests in moist, wooded areas, in mature trees, and hunt at the forest edge and open wooded areas near fields (Ehrlich, et al. 1988). Red-shouldered hawks are considered strike hazards on airfields. In addition, there has been increasing technical assistant calls in recent years concerning aggressive, nesting red-shouldered hawks.

Table 4.16. Number of red-shouldered hawks addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		
		WS' Relocation[1]	WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	1	1	0	0
2012	0	3	0	2
2013	0	3	0	0
Average	**0**	**2**	**0**	**1**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Both the regional and Ohio red-shouldered hawk population trends have been increasing since 1966. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move hawks when appropriate and safe. If hawks are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 75 red-shouldered hawks and lethally removing up to 50. Wildlife Services' proposed removal level will have no adverse direct or indirect effects on red-shouldered hawk populations based on the best available data. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for red-shouldered hawks in Ohio.

Red-tailed Hawk Biology and Population Impacts

OH population estimate: 22,000
BBS East, 1966-2012: 1.13%
BBS East, 2002-2012: 1.49%
WS removal as % of state population: 0.91%
Cumulative removal as % of state population: 1.08%

WS proposed removal: 200
BBS OH, 1966-2012: 3.52%
BBS OH, 2002-2012: 3.15%

Red-tailed hawks are probably one of the best-known and most common hawk species in North America. They range throughout North America to central Alaska and northern Canada, and south as far as Panama. Although not truly migratory, they do adjust seasonally to areas with abundant prey. In winter many of the northern birds move south. They nest in woodlands and feed on rodents and rabbits in open country. They often perch on poles or treetops to hunt.

Table 4.17. Number of red-tailed hawks addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		
		WS' Relocation[1]	WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	327	44	12	62
2012	207	64	11	46
2013	196	141	27	53
Average	**243**	**83**	**17**	**54**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Both the regional and Ohio red-tailed hawk population trends have been increasing since 1966.
As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move hawks when appropriate and safe. If hawks are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 400 red-tailed hawks and lethally removing up to 200. Wildlife Services' proposed removal level will have no adverse direct or indirect effects on red-tailed hawk populations based on the best available data. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for red-tailed hawks in Ohio.

Rough-legged Hawk Biology and Population Impacts

WS proposed removal: 50

Rough-legged hawks are winter residents in Ohio and breed in the Arctic. The first migrants have been seen as early as late September, and the last spring migrants have been seen in Ohio as late as the first couple weeks of May (Peterjohn 2001).

Because this species does not typically breed in the United States, there is no BBS data for rough-legged hawks. CBC data indicates an erratic trend of high populations and low populations, potentially following prey populations in their Arctic breeding grounds and Ohio wintering grounds (Peterjohn 2001). No population estimate was available for Ohio, however, in North America, analysis of BBS and NWT data indicates an estimate of 300,000 rough-legged hawks (PFSC 2013).

Table 4.18. Number of rough-legged hawks addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits		
		WS' Relocation[1]	WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	119	0	2	33
2012	9	0	0	10
2013	178	0	0	0
Average	**102**	**0**	**1**	**14**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Wildlife Services' management of rough-legged hawks is typically limited to airfields where they pose a strike hazard to aircraft. Therefore management of this species would by localized. As part of an

integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move hawks when appropriate and safe. If hawks are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports, WS anticipates banding and relocating up to 100 rough-legged hawks and lethally removing up to 50. Wildlife Services' proposed removal level would represent 0.02% of the North American rough-legged hawk population and will have no adverse direct or indirect effects on rough-legged hawk populations based on the best available data. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on red-tailed hawk populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for rough-legged hawks in Ohio.

Bald Eagle Biology and Population Impacts

BBS East, 1966-2012: 8.66%	BBS OH, 1966-2012: 13.55%
BBS East, 2002-2012: 13.09%	BBS OH, 2002-2012: 13.64%

The bald eagle is a large raptor often associated with aquatic habitats across North America with breeding populations occurring primarily in Alaska and Canada; however, eagles have been documented nesting in all 48 contiguous States, except Rhode Island and Vermont (Buehler 2000). Nesting normally occurs from late-March through September with eggs present in nests from late-May through the end of May. Eaglets can be found in nests generally from late-May through mid-September (Buehler 2000).

Although officially removed from the protection of the ESA across most of its range, the bald eagle is still afforded protection under the Bald and Golden Eagle Protection Act. Bald eagles are not listed by ODW.

During the migration period, eagles occur throughout the United States and parts of Mexico (Buehler 2000). Under the Bald and Golden Eagle Act, activities that could result in the "take" of eagles cannot occur unless the United States Fish and Wildlife Service allow those activities to occur through the issuance of a permit. Take could occur through purposeful take (e.g., harassing an eagle from an airport using pyrotechnics to alleviate aircraft strike hazards) or non-purposeful take (e.g., unintentionally capturing an eagle in a trap). Both purposeful take and non-purposeful take require a permit from the United States Fish and Wildlife Service (see 50 CFR 22.26, 50 CFR 22.27). In those cases where purposeful take could occur or where there is a high likelihood of non-purposeful take occurring, WS would apply for a permit for those activities.

Wildlife Services has received requests for assistance associated with bald eagles posing threats at or near airports. The large body size and soaring behavior of eagles can pose threats of aircraft strikes when eagles occur in close proximity to airports. Given the definition of "*molest*" and "*disturb*" under the Act as described above, the use of harassment methods to disperse eagles posing threats at or near airports could constitute "*take*" as defined under the Act which would require a permit from the USFWS to conduct those types of activities. For human safety purposes, as well as the safety of the eagle, harassment would be the primary method used to remove eagles from airport environments. Only if a nest could be linked to airport interference by eagles would it be removed, and only during non-breeding/nesting times of the year.

Under 50 CFR 22.26, WS and/or an airport authority could apply for a permit allowing for the harassment of eagles that pose threats of aircraft strikes at airports. Under this proposed action alternative, WS could

employ harassment methods to disperse eagles from airports or surrounding areas when authorized and permitted by the USFWS pursuant to the Act. Therefore, if no permit is issued by the USFWS to harass eagles that are posing a threat of aircraft strikes, no activities would be conducted by WS. Activities will only be conducted by WS when a permit allowing for the harassment of eagles has been issued to WS or to an airport authority where WS is working as a subpermittee under the permit issued to the airport. During FY11 through FY13, there had been 53 incidences of harassment of eagles at Ohio airports by WS. No lethal take of eagles would occur under this proposed action alternative.

Wildlife Services will abide by all measures and stipulations provided by the USFWS in permits issued for the harassment of eagles at airports to reduce aircraft strikes. The USFWS determined that the issuance of permits allowing the "*take*" of eagles as defined by the Act would not significantly impact the human environment when permits are issued for "*take*" of eagles under the guidelines allowed within the Act (USFWS 2010). Therefore, the issuance of permits to allow for the "*take*" of eagles, including permits issued to WS or other entities has been fully evaluated in a separate analysis (USFWS 2010).

Direct, Indirect, and Cumulative Effects:
Wildlife Services' harassment efforts will have no adverse direct effects on bald eagle populations as WS will comply with permit stipulations from the USFWS. No significant adverse cumulative impacts are expected as the USFWS provides oversight to all take permits, which will sufficiently monitor eagle management efforts by all entities.

Snowy Owl Biology and Population Impacts

Snowy owls breed in open terrain of the artic barrens from the Aleutian Islands along the northern edge of Alaska, throughout the Canadian Arctic Islands and from northern Yukon, northeastern Manitoba, northern Quebec, and northern Labrador (Parmelee 1992). They can be found in similar open habitats during their winter migrations. During the winter migrations, snowy owls can be found across Canada, Alaska, and the northern edge of the United States (Parmelee 1992). The open habitats of airports provide ideal wintering areas for snowy owls. Their low-flying behavior, along with their large size and body mass, (Parmelee 1992) makes them a significant hazard for a damaging strike (Dolbeer et al. 2013). The number of snowy owls observed during the CBC across all areas surveyed in the United States has shown a variable trend over the past 20 years (NAS 2010). There are no breeding or year-round populations of snowy owls within Ohio, and population trend data is limited and long-term data is lacking (Parmelee 1992).

BBS population trends for snowy owls don't currently exist. Audubon CBC data indicates erratic, relatively low, population trends in Ohio from 2002-2012 (NAS 2010). Nationwide trends for the same time period tend to be similar with spikes occurring every one to four years (NAS 2010).

Between 1990 and 2012, there have been 84 reported civil aircraft strikes involving snowy owls in the U.S. (Dolbeer et al. 2013). In the past five years, WS dispersed snowy owls on seven separate occasions to protect human safety at Ohio airports. Unfortunately, snowy owls generally become easily habituated to harassment measures and quickly become non-responsive, moving only a short distance or not at all. Thus, additional methods for wildlife hazard management may be necessary. As part of an integrated approach to reducing threats, WS would first employ non-lethal methods (e.g., pyrotechnics, aversive noise, trap/relocate) to disperse or move snowy owls when appropriate and safe. If snowy owls are deemed an immediate threat to aviation safety (e.g., flying along an active runway) or if repeated non-lethal methods have failed, WS may need to implement lethal removal options.

Direct, Indirect, and Cumulative Effects:
Based on surveys at Ohio airports and recent influxes of owls arriving at airports, WS anticipates banding and relocating up to 20 snowy owls and lethally removing up to 10 owls. Based on the limited

emergency lethal removal proposed and the permitting of lethal removal by the USFWS and the ODW, WS' lethal removal of snowy owls would not adversely affect snowy owl populations. The live-capture and translocation of owls to appropriate habitat would not adversely affect populations since the owls would be unharmed. Permitting by the USFWS and ODW ensure that cumulative impacts are within allowable take levels.

Black Vulture Biology and Population Impacts

OH population estimate: NA
BBS East, 1966-2012: 3.65%
BBS East, 2002-2012: 4.44%
WS proposed removal: 100
BBS OH, 1966-2012: 3.34%
BBS OH, 2002-2012: 6.53%

Range maps typically show this species' range in the southern part of Ohio, however, its range has been expanding north in recent years. The black vulture experienced range expansion during the late 1800s and early 1900s in southern Ohio (Peterjohn 2001). They have been found nesting in caves with sandstone cliffs, large hollow logs, abandoned buildings, and bare ground surrounded by boulders (Peterjohn 2001). In Ohio, the black vulture is listed as a Species of Concern.

Black vultures are primarily scavengers; however they will opportunistically kill and consume a wide variety of prey including birds, fish, meso-mammals, and livestock (Avery and Cummings 2004). It is livestock predations that typically result in WS management of black vultures. This species has been observed killing newborn lambs and calves (Avery and Cummings 2004).

Table 4.19. Number of black vultures addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	1,536	2	10
2012	59	4	8
2013	642	2	14
Average	**746**	**3**	**11**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Both the regional and Ohio black vulture population trends have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on black vulture populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for black vultures in Ohio.

Turkey Vulture Biology and Population Impacts

OH population estimate: 120,000
BBS East, 1966-2012: 3.64%
BBS East, 2002-2012: 4.85%
WS removal as % of state population: 0.17%
Cumulative removal as % of state population: 0.18%
WS proposed removal: 200
BBS OH, 1966-2012: 4.40%
BBS OH, 2002-2012: 3.52%

Turkey vultures prefer carrion, but will eat virtually anything, including insects, fish, tadpoles, decayed fruit, pumpkins, and recently hatched heron and ibis chicks (Brauning 1992). Unlike black vultures,

turkey vultures have a well-developed sense of smell and can locate decaying animals from considerable heights (Peterjohn 2001). Turkey vultures have been reported to live up to 16 years of age (Henny 1990).

Turkey vultures can be found throughout Mexico, across most of the United States, and along the southern tier of Canada (Wilbur 1983, Rabenhold and Decker 1989). This species is found throughout Ohio during the breeding season. However, many individuals are migratory, and in the winter most sightings are confined to southern Ohio (Peterjohn 2001). Migration typically happens in March and October, but happens as early as February and as late as December (Peterjohn 2001). Turkey vultures often roost in large groups near homes or other buildings where they can cause property damage from droppings or by pulling and tearing shingles.

Table 4.20. Number of turkey vultures addressed in Ohio from FY 2011 to FY 2013.

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Lethal Removal[1]	All Authorized Lethal Removal[2]
2011	3,957	6	23
2012	1,797	16	32
2013	1,255	19	26
Average	**2,336**	**14**	**27**

[1]Data reported by federal fiscal year
[2]Data reported by calendar year

Direct, Indirect, and Cumulative Effects:
Both the regional and Ohio turkey vulture population trends have been increasing since 1966. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on turkey vulture populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for turkey vultures in Ohio.

Additional Target Species

Target species, in addition to those species analyzed previously, that may be lethally removed in small numbers in the future include the following species: common goldeneye, bufflehead, ruddy duck, hooded merganser, red-breasted merganser, Northern cardinal, American robin, American goldfinch, snow bunting, blue jay, and chimney swift. Some of these target species have been lethally removed in small numbers by WS and have included no more than 20 individuals and/or no more than 20 nests annually. Based on previous requests for assistance, anticipation of future requests for assistance, and the removal levels necessary to alleviate those requests for assistance, no more than 20 individuals and 20 nests (and eggs) of each of those additional target species listed could be removed annually by WS.

The above mentioned waterfowl species maintain sufficient population densities to allow for annual harvest seasons. The proposed removal of up to 20 individuals and up to 20 nests under the proposed action would be a minor component of the annual harvest during the regulated hunting seasons. Wildlife Services does not anticipate any significant direct, indirect, or cumulative impacts to sportsmen's ability to harvest these species.

Wildlife Services anticipates that up to 10 American pipet (*Anthus rubescens*), American coot, pied-billed grebe (*Podilymbus podiceps*), belted kingfisher (*Ceryle alcyon*), short-eared owl, osprey (*Pandion haliaetus*), and osprey nests could be removed based on anticipated future requests.

In addition, WS anticipates that up to five peregrine falcon (*Falco peregrinus*), Northern harrier (*Circus cyaneus*), barn owl (*Tyto alba*), and cattle egret (*Bulbulcus ibis*) could be removed annually by WS. These species are listed by ODW as state threatened or endangered. Non-lethal methods will be attempted (including trap and relocate for the former three species) before lethal removal is performed. Any lethal removal of these species will be coordinated with the ODW.

Additional species mentioned in this EA, but not analyzed for lethal removal, are included due to the need for WS to harass these species from airport environments. Similar to harassment efforts for all other species, WS would not employ non-lethal methods over large geographical areas nor employ harassment methods at such intensity that essential resources (*e.g*. nesting locations, food sources) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to populations of target species. Non-lethal methods are generally regarded as having minimal impacts on overall populations of wildlife since those species are unharmed.

Wildlife Services will analyze the removal of Northern harriers as an indicator of no significant direct or cumulative adverse impacts to these additional species. Northern harriers represent the most sensitive species included in this group based on abundance and available habitat. Therefore, if harriers are not adversely impacted by WS' removal, then no other species in this group should suffer negative impacts to their statewide populations.

Northern Harrier Biology and Population Impacts

OH population estimate: 1,000
BBS East, 1966-2012: -2.05%
BBS East, 2002-2012: -0.70%
WS removal as % of state population: 0.5%
WS proposed removal: 5
BBS OH, 1966-2012: 2.24%
BBS OH, 2002-2012: -4.79%

Northern harriers are medium sized, ground nesting raptors that winter in Ohio. There are also breeding populations in Ohio, reported mostly in the northern part of the state. This species favors wet prairies and meadows as breeding habitat. As these habitats disappeared in Ohio, harriers began using upland pastures, hayfields, and reclaimed strip mines (Peterjohn 2001). Harriers have a low rolling flight as they hunt for rodents and other small prey. Because they are attracted to open grasslands, which airports mimic, they can become a strike risk at airports and airbases. During FY 11, 12, and 13 WS harassed 47, 16, and 10 harriers respectively. The USFWS did not report any lethal removal by WS or any other entities during 2011, 2012, and 2013.

Direct, Indirect, and Cumulative Effects:
Regional Northern harrier population trends have been decreasing since 1966. Ohio Northern harrier population trends have been increasing since 1966, however, they have been decreasing since 2002. The proposed lethal removal by WS is 0.5% of the estimated Northern harrier population in Ohio. Based on the best scientific data, WS' proposed removal level will have no adverse direct or indirect effects on Northern harrier populations. The permitting of the removal by the USFWS and the ODW pursuant to the MBTA ensures removal by WS and by other entities occurs within allowable removal levels to achieve the desired population objectives for Northern harriers in Ohio.

Summary

Evaluation of WS' activities relative to wildlife populations indicated that program activities will likely have no cumulative adverse effects on populations in Ohio. Wildlife Services' actions would be occurring simultaneously, over time, with other natural processes and human-generated changes that are currently taking place. Those activities include, but are not limited to:

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

All those factors play a role in the dynamics of wildlife populations. In many circumstances, requests for assistance arise when some or all of those elements have contrived to elevate target species populations or place target species at a juncture to cause damage to resources. Wildlife Services' actions to minimize or eliminate damage are constrained as to scope, duration and intensity, for the purpose of minimizing or avoiding impacts to the environment. Wildlife Services evaluates damage occurring, including other affected elements and the dynamics of the damaging species; determines appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992). This process allows WS to removal into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species. Most of those birds listed are afforded protection under the MBTA and lethal removal is only allowed through the issuance of a depredation permit and only at those levels stipulated in the permit. Therefore, those birds would be lethally removed in accordance with applicable state and federal laws and regulations authorizing lethal removal of migratory birds and their nests and eggs, including the USFWS and the ODW permitting processes. The USFWS, as the agency with management responsibility for migratory birds, could impose restrictions on depredation lethal removal as needed to assure cumulative lethal removal does not adversely affect the continued viability of populations. In addition, some of these species are listed species by ODW. Lethal removal of these species would be performed with approval with ODW. This would assure that cumulative impacts on these bird populations would have no significant adverse impact on the quality of the human environment.

Wildlife Disease Surveillance and Monitoring

The ability to efficiently conduct surveillance for and detect diseases is dependent upon rapid detection of the pathogen if it is introduced. Effective implementation of a surveillance system would facilitate planning and execution at regional and state levels, and coordination of surveillance data for risk assessment. It would also facilitate partnerships between public and private interests, including efforts by federal, state, and local governments as well as non-governmental organizations, universities, and other interest groups.[10] Current information on disease distribution and knowledge of the mixing of birds in migratory flyways has been used to develop a prioritized sampling approach based on the major North American flyways. Surveillance data from all of those areas would be incorporated into national risk assessments, preparedness and response planning to reduce the adverse impacts of a disease outbreak in wild birds, poultry, or humans.

To provide the most useful information and a uniform structure for surveillance, five strategies for collecting samples in birds have been proposed (Interagency Working Group for the Detection of HPAI Virus in Migratory Birds in the United States 2006). Those strategies include:

Investigation of Illness/Death in Birds: A systematic investigation of illness and death in wild birds may be conducted to determine the cause of the illness or the cause of death in birds. This strategy offers the best and earliest probability of detection if a disease is introduced by migratory birds into the United States. Illness and death involving wildlife are often detected by, or reported to natural resource agencies and entities. This strategy capitalizes on existing situations of birds without additional birds being handled or killed.

[10]Data collected by organizations/agencies conducting research and monitoring will provide a broad species and geographic surveillance effort.

Surveillance in Live Wild Birds: This strategy involves sampling live-captured, apparently healthy birds to detect the presence of a disease. Bird species that represent the highest risk of being exposed to, or infected with, the disease because of their migratory movement patterns (Interagency Working Group for the Detection of HPAI Virus in Migratory Birds in the United States 2006), or birds that may be in contact with species from areas with reported outbreaks would be targeted. Where possible, this sampling effort would be coordinated with local projects that already plan on capturing and handling the desired bird species. Coordinating sampling with ongoing projects currently being conducted by state and federal agencies, universities, and others maximizes use of resources and minimizes the need for additional bird capture and handling.

Surveillance in Hunter-harvested Birds: Check stations for waterfowl hunting or other harvestable bird species provide an opportunity to sample dead birds to determine the presence of a disease, and supplement data collected during surveillance of live wild birds. Sampling of hunter-killed birds would focus on hunted species that are most likely to be exposed to a disease; have relatively direct migratory pathways from those areas to the United States; commingle in Alaska staging areas with species that could bring the virus from other parts of the world;

Sentinel Species: Waterfowl, gamefowl, and poultry flocks reared in backyard facilities may prove to be valuable for early detection and used as for surveillance of diseases. Sentinel duck flocks may also be placed in wetland environments where they are potentially exposed to and infected with disease agents as they commingle with wild birds.

Environmental Sampling: Many avian diseases are released by waterfowl through the intestinal tract and can be detected in both feces and the water in which the birds swim, defecate, and feed. This is the principal means of virus spread to new birds and potentially to poultry, livestock, and humans. Analysis of water and fecal material from certain habitats can provide evidence of diseases circulating in wild bird populations, the specific types of diseases, and pathogenicity. Monitoring of water and/or fecal samples gathered from habitat is a reasonably cost effective, technologically achievable means to assess risks to humans, livestock, and other wildlife.

Direct, Indirect, and Cumulative Effects:

Under the disease sampling strategies listed above that could be implemented to detect or monitor avian diseases in the United States, WS' implementation of those sampling strategies would not create adverse direct or indirect effects on avian populations in the state. Sampling strategies that could be employed involve sampling live-captured birds that could be released on site after sampling occurs. The sampling (e.g., drawing blooding, feather sample, fecal sample) and the subsequent release of live-captured birds would not result in adverse direct or indirect effects since those birds are released unharmed on site. In addition, sampling of sick, dying, or hunter harvested birds would not result in the additive lethal removal of birds that would not have already occurred in the absence of a disease sampling program. Therefore, the sampling of birds for diseases would not create adverse cumulative impacts on the populations of any of the birds addressed in this EA nor would result in any removal of birds that would not have already occurred in the absence of disease sampling (e.g., hunter harvest).

Alternative 2 – Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not use lethal methods to resolve bird damage problems. Although some unintentional mortality might result from the use of bird capture devices like mist nets, these incidents are likely to be rare and would have negligible impacts on target species populations. Lethal methods could continue to be used under this alternative by those persons experiencing damage without involvement by WS. Individuals would still be able to obtain permits for lethal bird removal from ODW and USFWS. Efforts to reduce or prevent damage and risks to livestock and/or human health and safety

risks would likely be higher than with Alternative 1. If BDM is conducted by individuals with limited training or experience, it is possible that additional birds may be lethally removed in the course of attempts to resolve damage problems.

Direct, Indirect, and Cumulative Effects:
Depending upon the experience, training and methods available to the individuals conducting the BDM, potential adverse direct and indirect impacts on target bird populations would probably be the same or greater than with Alternative 1. However, for the same reasons shown under Alternative 1, it is unlikely that significant adverse direct or indirect effects would occur to target species' by implementation of this alternative. Impacts and potential risks of illegal toxicant use would be greater under this alternative than Alternative 1. DRC-1339 and Alpha-chloralose are currently only available for use by WS employees and would not be available under this alternative, although Starlicide, a product similar to DRC-1339 would be available for use by licensed pesticide applicators. It is possible that frustration caused by the inability to reduce damage by the public would lead to illegal use of toxicants by others which could increase adverse effects, however to an unknown degree. Because WS would be able to provide assistance with non-lethal BDM, risks of adverse impacts from actions by non-WS entities are lower than with Alternative 3.

Alternative 3 - No Bird Damage Management Conducted by WS

This alternative precludes any activities by WS to reduce threats to human health and safety, and alleviate damage to agricultural resources, property, and natural resources. Wildlife Services would not be involved with any aspect of bird damage management. All requests for assistance received by WS to resolve damage caused by birds would be referred to the USFWS, ODW, and/or private entities. This alternative would not deny other federal, state, and/or local agencies, including private entities from conducting damage management activities directed at alleviating damage and threats associated with birds. Many of the methods listed in Appendix B would be available for use by other agencies and private entities, unless otherwise noted in the Appendix, to manage damage and threats associated with birds.

Direct, Indirect, and Cumulative Effects:
Under this alternative, property owners/managers may have difficulty obtaining permits to use lethal methods. The USFWS needs professional recommendations on individual damage situations before issuing a depredation permit for lethal removal, and the USFWS does not have the mandate or the resources to conduct damage management activities. State agencies with responsibilities for migratory birds would likely have to provide this information if depredation permits are to be issued.

Local bird populations could decline, stay the same, or increase depending on actions taken by those persons experiencing bird damage. The direct and indirect effects on bird populations would be variable and unknown. Some resource/property owners may take illegal, unsafe, or environmentally harmful action against local populations of birds out of frustration or ignorance. While WS would provide no assistance under this alternative, other individuals or entities could conduct lethal damage management resulting in direct or indirect impacts similar to the proposed action.

Since birds would still be removed under this alternative, the potential direct, indirect, and cumulative effects on the populations of those bird species would be similar among all the alternatives for this issue. Wildlife Services' involvement would not be additive to removal that could occur since the cooperator requesting WS' assistance could conduct bird damage management activities without WS' direct involvement. Therefore, any actions to resolve damage or reduce threats associated with birds could occur by other entities despite WS' lack of involvement under this alternative, and therefore the cumulative impact on those bird species could be similar to Alternative 1.

Issue 2 - Effects on Non-target Wildlife Species Populations, Including T&E Species

A concern is often raised about the potential impacts to non-target species, including T&E species, from the use of methods to resolve damage caused by birds. The potential effects on the populations of non-target wildlife species, including T&E species, are analyzed below.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

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

Wildlife Services personnel are experienced and trained in wildlife identification and to select the most appropriate methods for taking targeted animals and excluding non-target species. To reduce the likelihood of capturing non-target wildlife, WS would employ the most selective methods for the target species, would employ the use of attractants that are as specific to target species as possible, and determine placement of methods to avoid exposure to non-targets. SOPs to prevent and reduce any potential adverse impacts on non-targets are discussed in Chapter 3 of this EA. Despite the best efforts to minimize non-target take during program activities, the potential for adverse impacts to non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety. From FY 2009 through FY 2013, the WS program in Ohio unintentionally killed five northern mockingbirds and three savannah sparrows in decoy traps. In addition, 1 ring-billed gull was caught in a rocket net operation, three dark-eyed juncos were caught in a sparrow trap, one eastern meadowlark was caught in a pole trap, and 12 northern mockingbirds and 38 savannah sparrows were caught in decoy trap; all of these were released unharmed.

Direct, Indirect, and Cumulative Effects:
While every precaution is taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by birds, the use of such methods can result in the incidental removal of unintended species. Those occurrences are rare and should not affect the overall populations of any species under the proposed action. Wildlife Services' removal of non-target species during activities to reduce damage or threats to human safety associated with birds is expected to be extremely low to non-existent. Wildlife Services would monitor the removal of non-target species to ensure program activities or methodologies used in bird damage management do not create direct effects on non-target populations. Methods available to resolve and prevent bird damage or threats when employed by trained, knowledgeable personnel are selective for target species. Wildlife Services would annually report to the USFWS and/or the ODW any non-target removal to ensure removal by WS is considered as part of management objectives established. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

Non-lethal methods have the potential to cause adverse effects to non-targets primarily through exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason the exclusion was erected; therefore, non-target species excluded from areas may potentially be adversely impacted if the area excluded is large enough. The use of auditory and visual dispersal methods used to reduce damage or threats caused by birds are also likely to disperse non-targets in the immediate area the methods are employed. Therefore, non-targets may be dispersed from an area while employing non-lethal dispersal techniques. However,

like target species, the potential impacts on non-target species are expected to be temporary with target and non-target species often returning after the cessation of dispersal methods. Non-lethal methods would not be employed over large geographical areas or applied at such intensity that essential resources (e.g., food sources, habitat) would be unavailable for extended durations or over a wide geographical scope that long-term adverse effects would occur to a species' population. Non-lethal methods are generally regarded as having minimal impacts on overall populations of wildlife since individuals of those species are unharmed. The use of non-lethal methods would not have significant adverse impacts on non-target populations under any of the alternatives.

Other non-lethal methods available for use under this alternative include live traps, nets, nest/egg destruction, translocation, and repellents. Live traps (e.g., cage traps, walk-in traps, decoy traps) and nets restrain wildlife once captured and are considered live-capture methods. Live traps have the potential to capture non-target species. Trap and net placement in areas where target species are active and the use of target-specific attractants would likely minimize the capture of non-targets. If traps and nets are attended to appropriately, most non-targets captured can be released on site unharmed. Therefore, no direct effects are expected on non-targets.

Only those repellents registered with the EPA pursuant to the FIFRA and registered for use in the state would be recommended and used by WS under this alternative. Therefore, the use and recommendation of repellents would not have negative direct or indirect effects on non-target species when used according to label requirements. Most repellents for birds are derived from natural ingredients that pose a very low risk to non-targets when exposed to or when ingested. Two chemicals commonly registered with the EPA as bird repellents are methyl anthranilate and anthraquinone. Methyl anthranilate naturally occurs in grapes. Methyl anthranilate has been used to flavor food, candy, and soft drinks. Anthraquinone naturally occurs in plants like aloe. Anthraquinone can be used to make dye. Both products claim to be unpalatable to many bird species. Several products are registered for use to reduce bird damage containing either methyl anthranilate or anthraquinone. Formulations containing those chemicals are liquids that are applied directly to susceptible resources. Mesurol is applied directly inside eggs that are of a similar appearance to those being predated on by crows. Therefore, risks to non-target would be restricted to those wildlife species that would select for the egg baits. However, adherence to the label requirements of mesurol would ensure threats to non-targets would be minimal. Similarly, when used in accordance with the label requirements, the use of Avitrol would also not create adverse direct effects on non-targets based on restrictions on baiting locations.

Immobilizing drugs are applied through hand-baiting that targets specific individuals or groups of target species. Therefore, immobilizing drugs are only applied after identification of the target occurs prior to application. Pre-baiting and acclimation of the target waterfowl occurs prior to the application of alpha chloralose which allows for the identification of non-targets that may visit the site prior to application of the bait. All unconsumed bait is retrieved after the application session has been completed. Since sedation occurs after consumption of the bait, personnel are present on site at all times to retrieve waterfowl. This constant presence by WS' personnel would allow for continual monitoring of the bait to ensure non-targets are not present. Based on the use pattern of alpha chloralose by WS, no adverse effects to non-targets would be expected from the use of alpha chloralose.

Nicarbazin is not currently registered for use in Ohio. Analysis of the non-target species risks from nicarbazin are analyzed here so that WS may have access to this method in the event that this product becomes available at a future date. Nicarbazin baits for geese could be used at office complexes, golf courses, residential communities, and municipalities. Although it is possible that other egg-laying species such as birds, reptiles, amphibians, fish, and invertebrates, could feed on the baits, which could reduce their egg-laying potential, the sites where the bait would be used are not as conducive to attracting many species of egg-laying animals. These areas are also places where T&E species are typically not found.

Birds in urban and suburban habitats are typically common species that have adapted to the presence of man. Only a few other species are expected to consume the baits, primarily mallards, domestic waterfowl, and possibly gulls, crows, and rock pigeons. In an Oregon field study, the primary non-target avian species to consume the bait were American crows, ravens, and mallards. However, because most bait consumption by non-target species is expected to be occasional or intermittent and the bait must be consumed regularly throughout the breeding season to inhibit reproduction, nicarbazin is not expected to have any significant impact on these species. Additionally, the size of the baits will prevent small birds and songbirds from eating the baits; small pieces of bait will be removed during the manufacturing process by sifting through screens. Studies on waterfowl in the Fort Collins, Colorado area have shown that most mallards will not eat the bait; they pick up the bait, manipulate it with their bill and then spit it out. However, mallards that are used to being fed by people could eventually eat the bait after the Canada geese on site began eating the bait. Since Canada geese will typically aggressively protect their food sources, they are expected to chase away any other birds attempting to eat the bait offered. Wildlife Services will also monitor the site prior to and during bait application to ensure that non-target species access to the site is limited to nonexistent and that there is no state or federally listed species that could consume the bait present at the site. Unconsumed bait will be picked up after the bait application period.

Canada geese typically nest earlier in the year than most other waterfowl species that would consume the bait and before many songbirds. Nicarbazin bait will be offered as early as February and will end in early April. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Since most waterfowl do not begin to nest until at least May, no effects on the hatchability of eggs of non-target waterfowl that do consume bait are expected as bait exposure will stop before their nesting season is beginning.

Risk of non-target species access to nicarbazin when used for rock pigeons is likely to be lower due to differences in the application strategy. As with the goose formulation, nicarbazin for pigeons in only registered for use in urban areas, applicators must ensure that children and pets do not come into contact with the product, the product cannot be used within 20 feet of any body of water, and the product may only be applied on rooftops or other flat paved or concrete surfaces. Applicators must confirm by visual observation that rock pigeons are eating the bait and non-targets are not feeding on the bait. The label stipulates that the bait application must be discontinued at sites if non-targets are observed feeding on the bait. As with the goose formulation, no excess bait may remain after feeding. The chemistry of the active ingredient assures that there is a low risk of any effect on a raptor. To have an effect, the bird must consume the bait. Once Nicarbazin is digested and absorbed, it is no longer biologically available to another bird. There is effectively no risk of secondary toxicity (http://www.innolyticsllc.com/new%20pigeon%20pages/pigeon_FAQ.html).

Studies of the effects of nicarbazin on animals other than birds that lay eggs have been limited to snakes. When brown tree snakes were treated with nicarbazin, the number of eggs laid, the hatchability of the eggs, and the health of the offspring were not affected by treatment. It is possible, but not probable, that other egg-laying species could feed on the bait such as turtles. However, WS will monitor the site prior to and during bait application and will remove the bait and/or change the bait application system to avoid exposure to non-target species.

Toxicity studies in birds and mammals given short and long-term doses of nicarbazin show minimal effects. The volume of Nicarbazin bait that would have to be consumed by non-target birds and mammals precludes them from being killed by exposure to the bait. For example, a rat would have to consume over 2.2 pounds of the Nicarbazin bait in a single feeding to reach the lethal dose required to kill 50% of the rats to consume that level of bait (LD_{50}). Extrapolations from data on chickens indicate that crows would have to eat 1.4 lbs of bait each day for 84 days before they would reach the LD_{50} (Bynam et al. 2005). Mammalian predators of geese that have eaten bait could also be exposed to the bait. However,

calculations of a worst case scenario by Bynam et al. (2005) indicate that a coyote (*Canis latrans*) would have to eat over 40 geese in a single day in order to reach the acute (one dose) LD_{50} for Nicarbazin determined for dogs weighing 25 lbs., or over 13 geese per day for 163 days to reach the chronic (repeated dose) LD_{50}.

Wildlife Services would also employ and/or recommend lethal methods under the proposed action alternative to alleviate damage. Lethal methods available for use to manage damage caused by birds under this alternative would include shooting and DRC-1339. In addition, birds could be euthanized once live-captured by other methods. Available methods and the application of those methods to resolve bird damage is further discussed in Appendix B.

The use of firearms is essentially selective for target species since animals are identified prior to application; therefore, no adverse direct or indirect effects to non-targets would be anticipated from use of this method. The euthanasia of birds by WS' personnel would be conducted in accordance with WS Directive 2.505. Chemical methods used for euthanasia would be limited to carbon dioxide administered in an enclosed chamber after birds have been live-captured. Since live-capture of birds using other methods occurs prior to the administering of euthanasia chemicals, no adverse direct or indirect effects to non-targets would occur under this alternative. Wildlife Services' recommendation that birds be harvested during the regulated season by private entities to alleviate damage would not increase risks to non-targets.

The pesticide DRC-1339 is often used at feed lots and other agricultural areas to reduce losses of feed and crops due to blackbird and starling damage. A common concern regarding the use of DRC-1339 is the potential non-target risks. All label requirements of DRC-1339 would be followed to minimize non-target hazards. As required by the label, all potential bait sites are pre-baited and monitored for non-target use as outlined in the pre-treatment observations section of the label. If non-targets are observed feeding on the pre-bait, the plots are abandoned and no baiting would occur at those locations. Treated bait is mixed with untreated bait per label requirements when applied to bait sites to minimize the likelihood of non-targets finding and consuming bait that has been treated. The bait type selected can also limit the likelihood that non-target species would consume treated bait since some bait types are not preferred by non-target species.

By acclimating target bird species to a feeding schedule, baiting can occur at specific times to ensure bait placed is quickly consumed by target bird species, especially when large flocks of target species are present. The acclimation period allows treated bait to be present only when birds are conditioned to be present at the site and provides a higher likelihood that treated bait would be consumed by the target species, which makes it unavailable to non-targets. In addition, many bird species when present in large numbers tend to exclude non-targets from a feeding area due to their aggressive behavior and by the large number of conspecifics present at the location. Therefore, risks to non-target species from consuming treated bait only occurs when treated bait is present at a bait location. Any treated bait remaining at the location after target birds had finished feeding would be removed to avoid attracting non-targets. Wildlife Services would retrieve all dead birds to the extent possible following treatment with DRC-1339.

DRC-1339 Primary Hazard Profile - DRC-1339 was selected for reducing bird damage because of its high toxicity to blackbirds (DeCino et al. 1966, West et al. 1967, Schafer, Jr. 1972) and low toxicity to most mammals, sparrows, and finches (Schafer, Jr. and Cunningham 1966, Apostolou 1969, Schafer, Jr. 1972, Schafer, Jr. et al. 1977, Matteson 1978, Cunningham et al. 1979, Cummings et al. 1992, Sterner et al. 1992). The likelihood of a non-target bird obtaining a lethal dose is dependent on: (1) frequency of encountering the bait, (2) length of feeding bout, (3) the bait dilution rate, (4) the bird's propensity to select against the treated bait, and (5) the susceptibility of the non-target species to the toxicant. Birds that ingest DRC-1339 probably die because of irreversible necrosis of the kidney and subsequent inability

to excrete uric acid (*i.e.*, uremic poisoning) (DeCino et al. 1966, Felsenstein et al. 1974, Knittle et al. 1990). Birds ingesting a lethal dose of DRC-1339 usually die in one to three days.

The median acute lethal dose (LD_{50})[11] values for starlings, blackbirds, and magpies (Corvidae) range from one to five mg/kg (Eisemann et al. 2003). For American crows, the median acute lethal dose has been estimated at 1.33 mg/kg (DeCino et al. 1966). The acute oral toxicity (LD_{50}) of DRC-1339 has been estimated for over 55 species of birds (Eisemann et al. 2003). DRC-1339 is toxic to mourning doves, pigeons, quail (*Coturnix coturnix*), chickens and ducks (*Anas* spp.) at ≥5.6 mg/kg (DeCino et al. 1966). In cage trials, Cummings et al. (1992) found that 2% DRC-1339-treated rice did not kill savannah sparrows (*Passerculus sandwichensis*). Gallinaceous birds and waterfowl may be more resistant to DRC-1339 than blackbirds, and their large size may reduce the chances of ingesting a lethal dose (DeCino et al. 1966). Avian reproduction does not appear to be affected from ingestion of DRC-1339 treated baits until levels are ingested where toxicity is expressed (USDA 2001).

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

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

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

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

DRC-1339 is rapidly metabolized and excreted and does not bioaccumulate, which probably accounts for its low secondary hazard profile (Schafer, Jr. 1991). For example, cats, owls, and magpies would be at risk only after exclusively eating DRC-1339-poisoned starlings for 30 continuous days (Cunningham et al. 1979). No probable risk is expected to American kestrels based on the low hazard quotient value for

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

marsh hawks used as a surrogate species (Schafer, Jr. 1970). The risk to mammalian predators from feeding on birds killed with DRC-1339 appears to be low (Johnston et al. 1999).

The risks associated with non-target animal exposure to DRC-1339 baits have been evaluated in rice fields in Louisiana (Glahn et al. 1990, Cummings et al. 1992, Glahn and Wilson 1992), poultry and cattle feedlots in several western states (Ford 1967, Royall et al. 1967), ripening sunflower fields in North Dakota (Linz et al. 2000), and around blackbird staging areas in east-central South Dakota (Knutsen 1998 and Smith 1999). Smith (1999) used field personnel and dogs to search for dead non-target animals and found no non-target carcasses that exhibited histological signs consistent with DRC-1339 poisoning. The other studies also failed to detect any non-target birds that had succumbed to DRC-1339. However, DRC-1339 is a slow-acting avicide and thus, some birds could move to areas not searched by the study participants before dying.

DRC-1339 Environmental Degradation - DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation and has a half-life of less than two days. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. The chemical tightly binds to soil and has low mobility. The half-life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (i.e., degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (EPA 1995). Therefore, WS does not expect any adverse indirect effects on non-target species through chemical contamination from soil or water supplies.

Additional concerns have been raised regarding the risks to non-target wildlife associated with crows caching bait treated with DRC-1339. Crows are known to cache surplus food usually by making a small hole in the soil using the bill, by pushing the food item under the substrate, or covering items with debris (Verbeek and Caffrey 2002). Distances traveled from where the food items were gathered to where the item is cached varies, but some studies suggests crows can travel up to 100 meters (Kilham 1989) and up to 2 kilometers (Cristol 2001, Cristol 2005). Caching activities appear to occur throughout the year, but may increase when food supplies are low. Therefore, the potential for treated baits to be carried from a bait site to surrounding areas exists as part of the food cache behavior exhibited by crows.

Several mitigating factors must be overcome for non-target risks to occur from bait cached by a crow. Those factors being: (1) the non-target wildlife species would have to locate the cached bait, (2) the bait-type used to target crows would have to be palatable or selected for by the non-target wildlife, (3) the non-target wildlife species consuming the treated bait would have to consume a lethal dose from a single bait, and (4) if a lethal dose is not achieved by eating a single treated cached bait, the non-target wildlife would have to ingest several treated baits (either from cached bait or from the bait site) to obtain a lethal dose which could vary by the species.

During the migration period, eagles occur throughout the United States and parts of Mexico (Buehler 2000). Under the Bald and Golden Eagle Act, activities that could result in the "take" of eagles cannot occur unless the United States Fish and Wildlife Service allow those activities to occur through the issuance of a permit. Take could occur through purposeful take (e.g., harassing an eagle from an airport using pyrotechnics to alleviate aircraft strike hazards) or non-purposeful take (e.g., unintentionally capturing an eagle in a trap). Both purposeful take and non-purposeful take require a permit from the United States Fish and Wildlife Service (see 50 CFR 22.26, 50 CFR 22.27). In those cases where purposeful take could occur or where there is a high likelihood of non-purposeful take occurring, WS would apply for a permit for those activities.

However, routine activities conducted by WS' personnel under the proposed action alternative could occur in areas where bald eagles were present, which could disrupt the current behavior of an eagle or eagles that were nearby during those activities. As discussed previously, "take" as defined by the Bald

and Golden Eagle Protection Act, include those actions that "disturb" eagles. Disturb has been defined under 50 CFR 22.3 as those actions that cause or are likely to cause injury to an eagle, a decrease in productivity, or nest abandonment by substantially interfering with their normal breeding, feeding, or sheltering behavior.

Wildlife Services has reviewed those methods available under the proposed action alternative and the use patterns of those methods. The routine measures that WS conducts would not meet the definition of disturb requiring a permit for the non-purposeful take of bald eagles. The USFWS states, "Eagles are unlikely to be disturbed by routine use of roads, homes, or other facilities where such use was present before an eagle pair nesting in a given area. For instance, if eagles build a nest near your existing home, cabin, or place of business you do not need a permit" (USFWS 2012). Therefore, activities that are species specific and are not of a duration and intensity that would result in disturbance as defined by the Act would not result in non-purposeful take. Activities, such as walking to a site, discharging a firearm, or riding an ATV along a trail, generally represent short-term disturbances to sites where those activities take place. Wildlife Services would conduct activities that were located near eagle nests using the National Bald Eagle Management Guidelines (USFWS 2007). The categories that would encompass most of these activities are Category D (Off-road vehicle use), Category F (Non-motorized recreation and human entry), and Category H (Blasting and other loud, intermittent noises). These categories generally call for a buffer of 330 to 660 feet for category D and F, and a ½-mile buffer for category H. Wildlife Services would take active measures to avoid disturbance of bald eagle nests by following the National Bald Eagle Management Guidelines. However, other routine activities conducted by WS do not meet the definition of "disturb" as defined under 50 CFR 22.3. Those methods and activities would not cause injuries to eagles and would not substantially interfere with the normal breeding, feeding, or sheltering behavior of bald eagles.

Summary

Wildlife Services does not anticipate any adverse cumulative impacts on non-target species from the implementation of the proposed bird damage management methods. Wildlife Services' take of non-target species during activities to reduce damage or threats to human safety associated with birds in Ohio is expected to be extremely low to non-existent. Wildlife Services would monitor the take of non-target species to ensure program activities or methodologies used in bird damage management do not adversely impact non-targets. Methods available to resolve and prevent bird damage or threats when employed by trained, knowledgeable personnel are selective for target species. Wildlife Services would annually report to the USFWS and/or the ODW any non-target take to ensure take by WS is considered as part of management objectives established. The potential impacts to non-targets are similar to the other alternatives and are considered to be minimal to non-existent.

The proposed bird damage management could benefit many other wildlife species that are impacted by predation or competition for resources. For example, crows are generally very aggressive nesting area colonizers and will force other species from prime nesting areas. American crows and fish crows often feed on the eggs, nestlings, and fledglings of other bird species. Fish crows are known to feed heavily on colonial water bird eggs (McGowan 2001). This alternative has the greatest possibility of successfully reducing bird damage and conflicts to wildlife species since all available methods could possibly be implemented or recommended by WS.

T&E Species Effects

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or minimization measures. SOPs to avoid T&E effects are described in Chapter 3 of this EA.

Federally Listed Species - The current list of species designated as threatened and endangered in Ohio as determined by the USFWS was obtained and reviewed during the development of this EA. Appendix C contains the list of species currently listed in the state along with common and scientific names. Wildlife Services conducted an informal Section 7 consultation with the USFWS in 2013 in which the USFWS concurred with WS' determinations (Appendix E). Wildlife Services determined that activities conducted pursuant to the proposed action would not likely adversely affect those species listed in the state by the USFWS, nor their critical habitats.

State Listed Species – The current list of species designated as endangered, threatened, special concern, or special interest by the state, as determined by the ODW, was obtained and reviewed during the development of the EA (see Appendix D). Based on the review of species listed, WS has determined that the proposed activities would not likely adversely affect those species currently listed by the state. In addition, ODW was consulted on this matter and concurred with WS' determinations (Appendix F). Wildlife Services consults with ODW for management activities that may affect state listed species.

Based on the methods available to resolve bird damage and/or threats, WS does not anticipate the number of non-targets taken to reach a magnitude where declines in those species' populations would occur. Therefore, take under the proposed action of non-targets will not cumulatively affect non-target species. Wildlife Services' has reviewed the T&E species listed by the ODW and USFWS and has determined that bird damage management activities proposed by WS would not likely adversely affect T&E species. Cumulative impacts would be minimal on non-targets from any of the alternatives discussed.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, risks to non-target species from WS actions would likely be limited to the use of frightening devices, exclusionary devices, and the risks of unintentional capture of a bird in a live-capture device as outlined under Alternative 1. Although the availability of WS assistance with non-lethal BDM methods could decrease incentives for non-WS entities to use lethal BDM methods, non-WS efforts to reduce or prevent damage could result in less experienced persons implementing bird damage management methods and lead to a greater take of non-target wildlife.

Direct, Indirect, and Cumulative Effects:
Similar to Alternative 3, it is possible that frustration from the resource owner due to the inability to reduce losses could lead to illegal use of toxicants, or other non-specific damage management methods by others could lead to unknown direct or indirect effects to non-target species populations, including T&E species (Appendix E). Hazards to T&E species could be more variable under this alternative than Alternative 1. Potential direct or indirect effects to non-target species could therefore be greater under this alternative if methods that are less selective or toxicants that cause secondary poisoning are used by non-WS entities. Direct effects on non-targets from non-lethal methods of bird damage management conducted by WS would be similar to Alternative 1. Since WS would be able to employ non-lethal methods under this alternative, indirect effects on non-target species could occur when implementing exclusionary devices if the area is large enough, but these indirect effects are expected to be minimal. The ability to reduce negative effects caused by birds to wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing BDM programs. It is possible that frustration caused by the inability to reduce losses would lead to non-specific damage management methods or illegal use of toxicants by others which could increase adverse cumulative impacts, however to unknown degree. While cumulative impacts would be variable, WS does not anticipate any significant cumulative impacts from this alternative.

Alternative 3 – No Bird Damage Management Conducted by WS

Under this alternative, birds could continue to be removed under depredation permits issued by the USFWS and the ODW, removal would continue to occur during the regulated harvest season, non-native bird species could continue to be removed without the need for a permit, and blackbirds could still be removed under the depredation orders. Risks to non-targets and T&E species would continue to occur from those who implement bird damage management activities on their own or through recommendations by the other federal, state, and private entities. Although some risks occur from those people that implement bird damage management in the absence of any involvement by WS, those risks are likely low and are similar to those under the other alternatives.

Direct, Indirect, and Cumulative Effects:
Under this alternative, WS would not be directly involved with damage management activities. Therefore, no direct impacts to non-targets or T&E species would occur by WS under this alternative.
The ability to reduce damage and threats of damage caused by birds to other wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing damage management actions under this alternative. The risks to non-targets and T&E species would be similar across the alternatives since most of those methods described in Appendix B would be available across the alternatives. If those methods available were applied as intended, risks to non-targets would be minimal to non-existent. If methods available were applied incorrectly or applied without knowledge of bird behavior, risks to non-target wildlife would be higher under this alternative. If frustration from the lack of available assistance causes those persons experiencing bird damage to use methods that were not legally available for use, risks to non-targets would be higher under this alternative. People have resorted to the use of illegal methods to resolve wildlife damage that have resulted in the lethal take of non-target wildlife (e.g., White et al. 1989, USFWS 2001, FDA 2003). Therefore, adverse direct, indirect, or cumulative impacts to non-targets, including T&E species, could occur under this alternative; however WS does not anticipate any significant cumulative impacts.

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

A common concern is the potential adverse effects that available methods could have on human health and safety. The threats to human safety of methods available under the alternatives are evaluated below by each of the alternatives.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

The cooperator requesting assistance is made aware through a MOU, cooperative service agreement, inter-agency agreement, or a similar document that those methods agreed upon could potentially be used on property owned or managed by the cooperator; thereby, making the cooperator aware of the use of those methods on property they own or manage to identify any risks to human safety associated with the use of those methods.

Wildlife Services would use the Decision Model to determine the appropriate method or methods that would effectively resolve the request for assistance. Those methods would be continually evaluated for effectiveness and if necessary, additional methods could be employed. Risks to human safety from technical assistance conducted by WS would be similar to those risks addressed under the other alternatives. The use of non-lethal methods as part of an integrated approach to managing damage that would be employed as part of direct operational assistance by WS would be similar to those risks addressed by the other alternatives.

Lethal methods available under the proposed action would include the use of firearms, DRC-1339, live-capture followed by euthanasia, and the recommendation that birds be harvested during the regulated hunting season established for those species by the USFWS and ODW. Although some formulations of the avicide DRC-1339 are restricted to use by WS only, a similar product containing the same active ingredient as DRC-1339 could be made available for use as a restricted use pesticide by other entities.

Wildlife Services' employees who conduct activities would be knowledgeable in the use of methods, wildlife species responsible for causing damage or threats, and WS' directives. That knowledge would be incorporated into the decision-making process inherent with the WS' Decision Model that would be applied when addressing threats and damage caused by birds. Prior to and during the utilization of lethal methods, WS' employees would consider risks to human safety based on location and method. Risks to human safety from the use of methods would likely be greater in urban areas when compared to rural areas that are less densely populated. Consideration would also be given to the location where damage management activities would be conducted based on property ownership. If locations where methods would be employed occur on private property in rural areas where access to the property is controlled and monitored, the risks to human safety from the use of methods would likely be less. If damage management activities occur at parks or near other public use areas, then risks of the public encountering damage management methods and the corresponding risk to human safety increases. Activities would generally be conducted when human activity is minimal (e.g., early mornings, at night) or in areas where human activities are minimal (e.g., in areas closed to the public).

The use of live-capture traps has also been identified as a potential issue. Live-capture traps are typically set in situations where human activity is minimal to ensure public safety. Traps rarely cause serious injury and are triggered through direct activation of the device. Live-capture traps available for birds are typically walk-in style traps where birds enter, but are unable to exit. Therefore, human safety concerns associated with live traps used to capture birds require direct contact to cause bodily harm.

Other live-capture devices, such as cannon nets, pose minor safety hazards to the public since activation of the device occurs by trained personnel after target species are observed in the capture area of the net. Lasers also pose minimal risks to the public since application occurs directly to target species by trained personnel; thereby, limiting exposure of the public to misuse of the method.

Safety issues can arise related to misusing firearms and the potential human hazards associated with firearm use when employed to reduce damage and threats. To help ensure safe use and awareness, WS' employees who use firearms to conduct official duties are required to attend an approved firearm safety training course and to remain certified for firearm use, WS' employees must attend a re-certification safety training course in accordance with WS Directive 2.615. Wildlife Services' employees who carry and use firearms as a condition of employment are required to attest that they have not been convicted of a misdemeanor crime of domestic violence. A thorough safety assessment would be conducted before firearms were deemed appropriate to alleviate or reduce damage and threats to human safety when conducting activities. Wildlife Services would work closely with cooperators requesting assistance to ensure all safety issues were considered before the use of firearms was deemed appropriate. All methods, including firearms, must be agreed upon with the cooperator to ensure the safe use of methods.

All WS' personnel who handle and administer chemical methods would be properly trained in the use of those methods. Training and adherence to agency directives would ensure the safety of employees applying chemical methods. Birds euthanized by WS or lethally removed using chemical methods would be disposed of in accordance with WS Directive 2.515 and applicable federal and state permits. All euthanasia would occur in the absence of the public to further minimize risks. SOPs are further described in Chapter 3 of this EA.

The recommendation of repellents or the use of those repellents registered for use to disperse birds could occur under the proposed action as part of an integrated approach to managing bird damage. Those chemical repellents that would be available to recommend for use or be directly used by WS under this alternative would also be available under any of the alternatives. Therefore, risks to human safety from the recommendation of repellents or the direct use of repellents would be similar across all the alternatives. Risks to human safety associated with the use or recommendation of repellents would be similar across all the alternatives. Wildlife Services' involvement, either through recommending the use of repellents or the direct use of repellents, would ensure that label requirements of those repellents are discussed with those persons requesting assistance when recommended through technical assistance or would be specifically adhered to by WS' personnel when using those chemical methods. Therefore, the risks to human safety associated with the recommendation of or direct use of repellents could be lessened through WS' participation.

Mesurol contains the active ingredient methiocarb and is registered by the EPA for use to condition crows not to feed on the eggs of T&E species. Mesurol is currently not registered for use in Ohio, but will be evaluated in this assessment as a repellent that could be employed under the proposed action if the product becomes available. Human safety risks associated with the use of mesurol occur primarily to the mixer and handler during preparation. Wildlife Services' personnel would follow all label requirements, including the personal protective equipment required to handle and mix bait. When used according to label requirements, the risks to human safety from the use of mesurol would be minimal.

Risks to human safety from the use of avicides could occur either through direct exposure of the chemical or exposure to the chemical from birds that have been lethally removed. The only avicide currently registered for use in Ohio is DRC-1339 (3-chloro-p-toluidine hydrochloride) that could be used for bird damage management. The mixing, drying, and storage of DRC-1339 treated bait occurs in controlled areas that are not accessible by the public. Therefore, risks to public safety from the preparation of DRC-1339 are minimal. Some risks do occur to the handlers during the mixing process from inhalation and direct exposure on the skin and eyes. Adherence to label requirements during the mixing and handling of DRC-1339 treated bait for use of personal protective equipment ensures the safety of WS' personnel handling and mixing treated bait. Therefore, risks to handlers and mixers that adhere to the personal protective equipment requirements of the label are low.

Locations where treated bait may be placed are determined based on product label requirements (*e.g.*, distance from water, specific location restrictions), the target bird species use of the site (determined through pre-baiting and an acclimation period), on non-target use of the area (areas with non-target activity are not used or abandoned), and based on human safety (e.g., in areas restricted or inaccessible by the public or where warning signs have been placed). Once appropriate locations were determined, treated baits would be placed in feeding stations or would be broadcast using mechanical methods (ground-based equipment or hand spreaders) and by manual broadcast (distributed by hand) per label requirements. Once baited using the diluted mixture (treated bait and untreated bait) when required by the label, locations would be monitored for non-target activity and to ensure the safety of the public. After each baiting session, all uneaten bait would be retrieved. The pre-baiting period allows treated bait to be placed at a location only when target birds were conditioned to be present at the site and provides a higher likelihood that treated bait would be consumed by the target species, which makes it unavailable for potential exposure to humans. To be exposed to the bait, someone would have to approach a bait site and handle treated bait. If the bait had been consumed by target species or was removed by WS, then treated bait would no longer be available and human exposure to the bait could not occur. Therefore, direct exposure to treated bait during the baiting process would only occur if someone approached a bait site that contained bait and if treated bait was present, would have to handle treated bait.

Factors that minimize any risk of public health problems from the use of DRC-1339 are: 1) its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions, DRC-1339 is not applied to feed materials that livestock can feed upon), 2) DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours; in general, DRC-1339 on treated bait material is almost completely broken down within a week if not consumed or retrieved, 3) the chemical is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people, 4) application rates are extremely low (EPA 1995), 5) a human would need to ingest the internal organs of birds found dead from DRC-1339 to be exposed, and 6) the EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells) studies, this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995).

Of additional concern is the potential exposure of people to crows harvested during the regulated hunting season that have ingested DRC-1339 treated bait. The hunting season for crows during the development of this assessment essentially occurred from early June to early March, Friday, Saturday, and Sunday only, with no daily take (bag) limit or possession limit (ODW 2014a). Under the proposed action, baiting using DRC-1339 to reduce crow damage could occur during the period of time when crows can be harvested. Although baiting could occur in rural areas during those periods, most requests for assistance to manage crow damage during the period of time when crows can be harvested occur in urban areas associated with urban crow roosts. Crows using urban communal roost locations often travel long distances to forage before returning to the roost location during the evening.

For a crow that ingested DRC-1339 treated bait to pose a potential risk to human safety to someone harvesting crows during the hunting season, a hunter would have to harvest a crow that ingested DRC-1339 treated bait and subsequently consume certain portions of the crow. The mode of action of DRC-1339 requires ingestion by crows so handling a crow harvested or found dead would not pose any primary risks to human safety. Although not specifically known for crows, in other sensitive species, DRC-1339 is metabolized and/or excreted quickly once ingested. In starlings, nearly 90% of the DRC-1339 administered dosages well above the LD_{50} for starlings was metabolized or excreted within 30 minutes of dosage (Cunningham et al. 1979). In one study, more than 98% of a DRC-1339 dose delivered to starlings could be detected in the feces within 2.5 hours (Peoples and Apostolou 1967) with similar results found for other bird species (Eisemann et al. 2003). Once death occurs, DRC-1339 concentrations appear to be highest in the gastrointestinal tract of birds, but some residue could be found in other tissue of carcasses examined (Giri et al. 1976, Cunningham et al. 1979, Johnston et al. 1999) with residues diminishing more slowly in the kidneys (Eisemann et al. 2003). However, most residue tests to detect DRC-1339 in tissues of birds have been completed using DRC-1339 dosages that far exceeded the known acute lethal oral dose for those species tested and far exceeds the level of DRC-1339 that would be ingested from treated bait. Johnston et al. (1999) found DRC-1339 residues in breast tissue of boat-tailed grackles (*Quiscalus major*) using acute doses ranging from 40 to 863 mg/kg. The acute lethal oral dose of DRC-1339 for boat-tailed grackles has been estimated to be ≤ 1 mg/kg, which is similar to the LD_{50} for crows (Eisemann et al. 2003). In those boat-tailed grackles consuming a trace of DRC-1339 up to 22 mg/kg, no DRC-1339 residues were found in the gastrointestinal track nor found in breast tissue (Johnston et al. 1999).

In summary, nearly all of the DRC-1339 ingested by sensitive species is metabolized or excreted quickly, normally within a few hours. Residues of DRC-1339 have been found in the tissues of birds consuming DRC-1339 at very high dosage rates that exceed current acute lethal dosages achieved under the label requirements of DRC-1339. Residues of DRC-1339 ingested by birds appear to be primarily located in the gastrointestinal tract of birds.

Under the proposed action, the controlled and limited circumstances in which DRC-1339 would be used would prevent any exposure of the public to this chemical. Based on current information, the human health risks from the use of DRC-1339 would be virtually nonexistent under this alternative.

Reproductive inhibitors are formulated on bait and are administered to target wildlife through consumption of treated bait. Therefore, the current concern, outside of transport and storage, is the risks directly to the handler and support staff during the handling and distributing the bait on the ground for consumption.

Threats to human safety from the use of nicarbazin would likely be minimal if labeled directions are followed. The use pattern of nicarbazin would also ensure threats to public safety are minimal. The label requires an acclimation period, which assists with identifying risks, requires the presence of the applicator at the location until all bait is consumed, and requires any unconsumed bait be retrieved. The EPA has characterized nicarbazin as a moderate eye irritant. The FDA has established a tolerance of nicarbazin residues of four parts per million allowed in uncooked chicken muscle, skin, liver, and kidney (21 CFR 556.445). The EPA characterized the risks of human exposure as low when used to reduce egg hatch in Canada geese. The EPA also concluded that if human consumption occurred, a prohibitively large amount of nicarbazin would have to be consumed to produce toxic effects (EPA 2005). Based on the use pattern of the nicarbazin and if label instructions are followed, risks to human safety would be low with the primary exposure occurring to those handling and applying the product. Safety procedures required by the label, when followed, would minimize risks to handlers and applicators.

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

Alpha-chloralose is an immobilizing agent available only for use by WS. The FDA has approved the use of alpha chloralose as an Investigative New Animal Drug (INAD) (INAD #6602) to be used for the immobilization and capture of certain species of birds by trained WS' personnel. Alpha-chloralose is administered to target individuals, either as a tablet or liquid solution contained within a bread ball or as a powder formulated on whole kernel corn. All unconsumed baits are retrieved. Since applicators are present at all times during application of alpha chloralose, the risks to human safety are low. All WS' employees using alpha chloralose are required to successfully complete a training course on the proper use and handling of alpha chloralose. All WS' employees who use alpha chloralose would wear the appropriate personal protective equipment required to ensure the safety of employees.

Of additional concern with the use of immobilizing drugs and reproductive inhibitors is the potential for human consumption of meat from waterfowl that have been immobilized using alpha chloralose or have consumed nicarbazin. Since waterfowl are harvested during a regulated harvest season and consumed, the use of immobilizing drugs and potentially reproductive inhibitors is of concern. The intended use of immobilizing drugs is to live-capture waterfowl. Waterfowl are conditioned to feed during a period in the day when consumption of treated bait ensures waterfowl do not disperse from the immediate area where the bait is applied. The use of immobilizing drugs and reproductive inhibitors targets waterfowl in urban environments where hunting and the harvest of waterfowl does not occur or is unlikely to occur (e.g., due to city ordinances preventing the discharge of a firearm within city limits). However, it could be possible for target waterfowl to leave the immediate area where baiting is occurring after consuming bait and enter

areas where hunting could occur. To mitigate this risk, withdrawal times are often established. A withdrawal time is the period established between when the animal consumed treated bait to when it is safe to consume the meat of the animal by humans. In compliance with FDA use restrictions, the use of alpha chloralose is prohibited for 30 days prior to and during the hunting season on waterfowl and other game birds that could be hunted. In the event that WS were requested to immobilize waterfowl or use nicarbazin during a period of time when harvest of waterfowl was occurring or during a period of time where a withdrawal period could overlap with the start of a harvest season, WS would not use either immobilizing drugs or nicarbazin. In those cases, other methods would be employed.

Direct, Indirect, and Cumulative Effects:
No adverse effects to human safety have occurred from WS' use of methods to alleviate bird damage from FY 2009 through FY 2013. The risks to human safety from the use of non-lethal and lethal methods, when used appropriately and by trained personnel, is considered low. No adverse direct effects to human health and safety are expected through the use of live-capture traps and devices or other non-lethal methods. Since WS personnel are required to complete and maintain firearms safety training, no adverse direct effects to human health and safety are expected as a result of the misuse of firearms by WS personnel. Additionally, all WS personnel are properly trained on all chemicals handled and administered in the field, ensuring their safety as well as the safety of the public. Therefore, adverse direct effects to human health and safety from chemicals used by WS are anticipated to be very low. The amount of chemicals used or stored by WS and cooperating agencies would be minimal to ensure human safety. Based on potential use patterns, the chemical and physical characteristics of the above mentioned toxicants and repellents, and factors related to the environmental fate, no cumulative impacts are expected from the chemical components used or recommended by the WS program in Ohio. Since DCR-1339 and alpha chloralose are only available to WS and Starlicide, which is available to licensed pesticide applicators, has a similar hazard profile to DCR-1339, WS does not anticipate any adverse cumulative impacts to human health and safety from the use of these chemicals. Since the WVDNR requires hunter and trapper safety training for all sportsmen, WS does not expect any additional adverse cumulative impacts to human safety from the use of firearms when recommending that birds be harvested during regulated hunting seasons to help alleviate damage.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not use lethal BDM methods. Concerns about human health risks from WS' use of lethal bird damage management methods would be alleviated because no such use would occur. However, Avitrol and the toxicant "Starlicide" which has the same active ingredient as DRC-1339 would be available to licensed pesticide applicators.

Benefits to the public from WS BDM activities will depend on the ability of WS to resolve problems using non-lethal methods and the effectiveness of non-WS BDM efforts. In situations where risks to human health and safety from birds cannot be resolved using nonlethal methods, benefits to the public will depend on the efficacy of non-WS use of lethal BDM methods. If lethal BDM programs are implemented by individuals with less experience than WS, they may not be able to effectively resolve the problem or it may take longer to resolve the problem than with a WS program.

Direct, Indirect, and Cumulative Effects:
Since most methods available to resolve or prevent bird damage or threats are available to anyone, the direct, indirect, and cumulative effects to human safety from the use of those methods are similar between the alternatives. Private efforts to reduce or prevent damage would be expected to increase, and would likely result in less experienced persons implementing chemical or other damage management methods which may have variable adverse direct, indirect, and/or cumulative effects to human and pet health and safety than under Alternative 1. Ignorance and/or frustration caused by the inability to reduce losses

could lead to illegal use of toxicants by others which could lead to unknown direct, indirect, and/or cumulative impacts to humans and pets. DRC-1339 and alpha chloralose would not be available under this alternative to non-WS entities experiencing damage or threats from birds and WS would not use DCR-1339 under this alternative since it is lethal, therefore no cumulative impacts to human health and safety should occur from these chemicals.

Alternative 3 – No Bird Damage Management Conducted by WS

Under the no bird damage management alternative, WS would not be involved with any aspect of managing damage associated with birds, including technical assistance. Due to the lack of involvement in managing damage caused by birds, no impacts to human safety would occur directly from WS. This alternative would not prevent those entities experiencing threats or damage from birds from conducting damage management activities in the absence of WS' assistance. Many of the methods discussed in Appendix B would be available to those persons experiencing damage or threats and could be used to lethally remove birds if permitted by the USFWS and/or ODW. The direct burden of implementing permitted methods would be placed on those experiencing damage.

Direct, Indirect, and Cumulative Effects:
Since most methods available to resolve or prevent bird damage or threats are available to anyone, the adverse direct, indirect, and cumulative effects to human safety from the use of those methods are similar between the alternatives. Non-chemical methods available to alleviate or prevent damage associated with birds generally do not pose risks to human safety. Since most non-chemical methods available for bird damage management involve the live-capture or harassment of birds, those methods are generally regarded as posing minimal risks to human safety. Habitat modification and harassment methods are also generally regarded as posing minimal risks to human safety. Although some risks to safety are likely to occur with the use of pyrotechnics, propane cannons, and exclusion devices, those risks are minimal when those methods are used appropriately and in consideration of human safety. The only methods that would be available under this alternative that would involve the direct lethal taking of birds are shooting and nest destruction. Under this alternative, shooting and nest destruction would be available to those persons experiencing damage or threats of damage when permitted by the USFWS and ODW. Firearms, when handled appropriately and with consideration for safety, pose minimal risks to human safety.

Similar to the technical assistance only alternative, DRC-1339, mesurol, and alpha chloralose would not be available under this alternative to those experiencing damage or threats from birds. Since most methods available to resolve or prevent bird damage or threats are available to anyone, the threats to human safety from the use of those methods are similar between the alternatives. However, methods employed by those persons not experienced in the use of methods or are not trained in their proper use, could increase the adverse direct, indirect, and/or cumulative impacts to human safety. Overall, the methods available to the public, when applied correctly and appropriately, pose minimal risks to human safety.

Issue 4 - Effects on the Aesthetic Values of Birds

People often enjoy viewing, watching, and knowing birds exist as part of the natural environment and gain aesthetic enjoyment in such activities. Those methods available to alleviate damage are intended to disperse and/or remove birds. Non-lethal methods are intended to exclude or make an area less attractive, which disperses birds to other areas. Similarly, lethal methods are intended to remove those birds identified as causing damage or posing a threat of damage. The effects on the aesthetic value of birds as it relates to the alternatives are discussed below.

Alternative 1 - Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)

Under the proposed action, methods would be employed that would result in the dispersal, exclusion, or removal of individuals or small groups of birds to resolve damage and threats. In some instances where birds are dispersed or removed, the ability of interested persons to observe and enjoy those birds would likely temporarily decline. Even the use of exclusionary devices can lead to the dispersal of wildlife if the resource being damaged was acting as an attractant. Thus, once the attractant has been removed or made unavailable, the wildlife would likely disperse to other areas where resources are more available.

The use of lethal methods would result in temporary declines in local populations resulting from the removal of birds to address or prevent damage and threats. The goal under the proposed action is to respond to requests for assistance and to manage those birds responsible for the resulting damage. Therefore, the ability to view and enjoy birds would remain if a reasonable effort is made to locate birds outside the area in which damage management activities occurred. Those birds removed by WS are those that could be removed by the person experiencing damage.

All activities are conducted where a request for assistance has been received and only after agreement for such services have been agreed upon by the cooperator. Some aesthetic value would be gained by the removal of birds and the return of a more natural environment, including the return of native wildlife and plant species that may be suppressed or displaced by high bird densities.

Direct, Indirect, and Cumulative Effects:
Since those birds removed by WS under this alternative could be removed with a depredation permit issued by the USFWS, under depredation orders, under control orders, without the need for a permit (non-native species), or the regulated hunting seasons, WS' involvement in taking those birds would not likely be additive to the number of birds that could be lethally removed in the absence of WS' involvement. Wildlife Services' lethal removal of birds from FY 2009 through FY 2013 has been of low magnitude compared to the total mortality and populations of those species. Wildlife Services' activities are not likely additive to the birds that would be lethally removed in the absence of WS' involvement. Given the limited lethal removal proposed by WS under this alternative when compared to the known sources of mortality of birds, WS' bird damage management activities conducted pursuant to the proposed action would not adversely affect the aesthetic value of birds. The impact on the aesthetic value of birds and the ability of the public to view and enjoy birds under the proposed action would be similar to the other alternatives and is likely insignificant.

When damage caused by birds has occurred, any removal of birds by the property or resource owner would likely occur whether WS was involved with taking the birds or not. Therefore, the activities of WS are not expected to have any cumulative adverse effects on this element of the human environment if occurring at the request of a property owner and/or manager. No significant cumulative impact is expected because the bird populations are a renewable resource and therefore will be replaced with new birds in the following years. The purpose of WS involvement is to alleviate the damage caused by the bird, not to eradicate the species.

Alternative 2 - Bird Damage Management by WS using only Non-lethal Methods

Under this alternative, WS would not conduct any lethal BDM, but may conduct harassment of birds that are causing damage. Other non-lethal methods may be conducted as well under this alternative to help alleviate damage caused by birds.

Direct, Indirect, and Cumulative Effects:
Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the Proposed Action Alternative. Cumulative impacts are expected to be similar to Alternative 1 as well.

Assuming property owners would choose to allow and pay for the implementation of non-lethal methods by WS, this alternative could result in birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Thus, this alternative would likely result in more property owners experiencing adverse direct and/or indirect effects on the aesthetic values of their properties than the Proposed Action Alternative. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

Alternative 3 – No Bird Damage Management Conducted by WS

Under the no bird damage management by WS alternative, the actions of WS would have no impact on the aesthetic value of birds. Those persons experiencing damage or threats from birds would be responsible for researching, obtaining, and using all methods as permitted by federal, state, and local laws and regulations. The degree to which damage management activities would occur in the absence of assistance by any agency is unknown but likely lower compared to damage management activities that would occur where some level of assistance was provided. Birds could still be dispersed or removed under this alternative by those persons experiencing damage or threats of damage. Lethal removal could also occur during the regulated harvest season, pursuant to the blackbird depredation order, and in the case of non-native species, lethal removal could occur any time without the need for a depredation permit.

Direct, Indirect, and Cumulative Effects:
The potential direct and indirect effects on the aesthetic values of birds could be similar to the proposed action if similar levels of damage management activities are conducted by those persons experiencing damage or threats or is provided by other entities. If no action is taken or if activities are not permitted by the USFWS and ODW, then no impact on the aesthetic value of birds would occur under this alternative.

Since birds could continue to be lethally removed under this alternative, despite WS' lack of involvement, the ability to view and enjoy birds would likely be similar to the other alternatives. The lack of WS' involvement would not lead to a reduction in the number of birds dispersed or lethally removed since WS' has no authority to regulate lethal removal or the harassment of birds. The USFWS and ODW have management authority over birds would continue to adjust all lethal removal levels based on population objectives for those bird species. Therefore, the number of birds lethally removed annually through hunting, under the depredation/control orders, and pursuant to depredation permits are regulated and adjusted by the USFWS and ODW. The cumulative impacts to the aesthetic value of birds would be similar to the other alternatives.

Summary

No significant cumulative environmental impacts are expected from any of the proposed actions analyzed in this EA. Under the Current/Proposed Action, the lethal removal of birds by WS has not and would not have a significant impact on overall bird populations in Ohio or nationwide, but some local reductions may occur. No risk to public safety is expected when WS' services are provided and accepted by continuing the BDM program with the included supplemental actions since only trained and experienced wildlife biologists/specialists would conduct and recommend bird damage management activities. Although some persons will likely be opposed to WS' participation in bird damage management activities

on public and private lands, the analysis in this EA indicates that WS integrated bird damage management program would not result in significant cumulative adverse impacts on the quality of the human environment.

CHAPTER 5: LIST OF PREPARERS AND PERSONS CONSULTED

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APPENDIX A

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APPENDIX B

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE IN OHIO

The most effective approach to resolving wildlife damage problems is to integrate the use of several methods, either simultaneously or sequentially. Integrated Wildlife Damage Management would integrate and apply practical methods to prevent and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on humans, other species, and the environment. Integrated Wildlife Damage Management may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these depending on the characteristics of specific damage problems.

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

A variety of methods (Table B-1) are potentially available to the WS program in Ohio for the management or reduction of bird damage. WS develops and recommends or implements IWDM strategies based on resource management, physical exclusion and wildlife management approaches. Within each approach there may be a number of specific methods or tactics available.

Various Federal, State, and local statutes and regulations and WS Directives govern WS use of damage management tools and substances. The following methods and materials are recommended or used in technical assistance and operational damage management efforts of the WS program in Ohio. The effectiveness of the program can be defined in terms of reduced economic losses, decreased health hazards, minimized property damage and overall improved quality of life.

Table B-1. Bird Damage Management Methods which would be Recommended or Used by WS under each Alternative.

Management Method	Alternative 1 Current Program	Alternative 2 Only Nonlethal	Alternative 3 No Program
Habitat Management	✓	✓	No
Lure Crops/Cultural	✓	✓	No
Human Behavior	✓	✓	No
Exclusion	✓	✓	No
Frightening Devices	✓	✓	No
Repellents	✓	✓	No
Reproductive	✓[1]	✓[1]	No
Live Traps	✓	✓	No
Alpha-chloralose [2, 3,4]	✓	✓	No
Egg	✓	No	No
Shooting	✓	No	No
DRC-1339 [2, 3]	✓	No	No
Avitrol[2]	✓	No	No
Euthanasia	✓	No	No
Hunting/DPs	✓	No	No

1 Depends on legal availability of this method in Ohio.
2 Only certified applicators could use.
3 Only registered for USDA-APHIS-WS use.
4 When used as a nonlethal technique birds captured with AC would not be killed.

NONLETHAL METHODS

Resource Management: Resource management includes a variety of practices that may be used by resource owners to reduce the potential for wildlife damage. These practices may include indoor feeding of livestock, changing flight patterns to avoid times of high bird activity, and removing habitat features that are attractive to damaging species.

Alter Aircraft Flight Patterns
In cases where the presence of birds at airports results in threats to air traveler safety and when such problems cannot be resolved by other means, the alteration of aircraft flight patterns or schedules may be recommended. However, altering operations at airports to decrease the potential for hazards is not feasible unless an emergency situation exists. Otherwise, the expense of interrupted flights and the limitations of existing facilities make this practice prohibitive

Cultural Methods
These generally involve modifications to the level of care or attention given to the resource, which may vary depending on the age, size, and location of the resource. Husbandry practices include but are not limited to techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994). Cultural methods may also include selection of crops/plants which are not as attractive to foraging birds or selecting short-season crops which can be harvested before migration season.

Environmental/Habitat Modification
Habitat modification is an integral part of bird damage management. The type, quality, and quantity of habitat are directly related to the wildlife that use that habitat. Therefore, habitat can be managed to not attract certain bird species or even to repel certain birds. Most habitat management revolves around airports and bird aircraft strike problems in Ohio. Habitat management around airports is aimed at eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water on the airfield. Habitat management is often necessary to minimize damage caused by blackbirds and starlings that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand. Roosts often will re-form at traditional sites, and substantial habitat alteration is the only way to permanently stop such activity.

Human Behavior Management
Human behavior management involves educating and encouraging members of the public to engage in behaviors which minimize the risk of conflicts with wildlife. These behaviors may include encouraging people to not feed birds at parks and other locations, and helping municipalities establish regulations prohibiting bird feeding at parks and other public areas. It may also include public education on the importance of proper waste disposal, encouraging the use of trash receptacles that restrict access by birds

Lure Crops/Alternate Foods
When depredations cannot be avoided by careful crop selection or modified planting schedules, lure crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area.

For lure crops to be effective, the ability to keep birds from surrounding fields would be necessary, and the number of alternative feeding sites must be minimal (Fairaizl and Pfeifer 1988). Additionally, lure crops reduce damage for only a short time (Fairaizl and Pfeifer 1988). The resource owner is limited in

implementing this method contingent upon ownership of, or otherwise ability to manage the property. Unless the original bird-human conflict is resolved, creation of additional habitat or feeding sites could increase future conflicts.

Lure crops would likely be planted on some land held in private ownership, such as conservation clubs, throughout Ohio. These plantings may provide some additional food or act as an attractant for birds. However, it is highly unlikely they contribute to conflicts with birds or act as significant attractants when one considers that millions of acres of the State are in corn, wheat, hay and soybean production which provides high quality foods for much of the year.

Contraception: Inhibiting reproduction is one way of reducing some bird populations. However, in long-lived species like geese (Cramp and Simmons 1977) exclusive use of contraceptive methods may take a period of years to reduce local bird populations. Contraceptive methods are likely to be most valuable as a means of maintaining waterfowl populations at desired levels.

Canada Geese have been successfully vasectomized to prevent production of young; this method is only effective if the female does not form a bond with a different male. In a study conducted at the NYC Bronx Zoo, females failed to maintain pair bonds with vasectomized males and did lay fertilized eggs (N. Clum, Assistant Curator of Ornithology, Bronx Zoo, pers. comm., July 2009). In addition, vasectomies can only prevent the production of the mated pair. The ability to identify breeding pairs for isolation and to capture a male bird for vasectomy becomes increasingly difficult as the number of birds increase (Converse and Kennelly 1994). Keefe (1996) estimated mechanical sterilization of a Canada goose to cost over $100 per bird. Additionally, as is the case with most procedures involving anesthesia in wild animals, some birds will likely die from the procedure.

The USDA, APHIS, WS National Wildlife Research Center (NWRC) has been instrumental in the development and registration of a new product, nicarbazin (OvoControl-GTM; CAS 330-95-0/4,4-dinitrocarbanilide (DNC, CAS 587-90-6)/ 2-hydroxy-4,6-dimethylpyrimidine (HDP, CAS 108-79-2) (1:1)), which is an infertility agent for Canada geese and Rock Pigeons in urban areas. Nicarbazin is available to certified pesticide applicators and is not restricted to use by WS. Use of baits containing nicarbazin would allow the numbers of small to moderate sized groups of Canada geese and Rock Pigeons to be controlled by reducing the hatchability of eggs laid by treated birds without requiring the location of each individual nest to be determined (as is the case for egg oiling/addling/destruction). Currently it is not registered for use in the state of Ohio.

Nicarbazin is thought to induce infertility in birds by two main mechanisms. Nicarbazin may disrupt the membrane surrounding the egg yolk, resulting in intermixing of egg yolk and white (albumin) components, creating conditions in which the embryo cannot develop. Nicarbazin may also inhibit incorporation of cholesterol into the yolk, a step that is necessary for yolk formation, thereby limiting energy for the developing embryo. If the yolk does not provide enough energy, the embryo will not completely form and the egg will never hatch. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Nicarbazin is undetectable in the plasma of Canada Geese, Mallards, and chickens by 4-6 days after consumption of nicarbazin bait has stopped. The levels of active ingredient in the blood are reduced by half within one day after bait consumption stops. If the level of active ingredient falls by approximately one half its peak levels, no effects on egg formation can be seen. By two days after bait consumption has stopped, no effects on the egg being formed are seen. Consequently, the bait must be offered to the birds each day of the nesting period for best impact on reproduction.

In a field study conducted in Oregon (Yoder et al. 2005), use of nicarbazin reduced hatchability of eggs 35.6% ($P = 0.062$). When considering the success of individual nests at sites rather than flocks as a

whole, percent hatchability was significantly reduced 50.7% ($P < 0.001$). The high degree of variability among Canada Geese in their movement patterns, nesting and habitat use complicates use of this product (Vercauteren and Marks 2004). The variability in goose behavior can make it difficult to get the required doses to the geese. Under current label guidelines, the cost for nicarbazin (Ovocontrol®) applications exceeds the cost of other control methods (Cooper and Keefe 1997) until the goose population reaches a critical threshold of approximately > 80 birds (Caudell and Shwiff 2006). Research conducted on captive pairs of Rock Pigeons use of nicarbazin resulted in 59% reduction in the number of eggs hatched (Avery et al. 2007, unpub. report).

Nicarbazin can be expensive to use. For example, the label for pigeons recommends approximately 1 lb. of bait per day for approximately 80 pigeons and 5 lbs. of bait per day for 400 pigeons. At this rate, and an estimated cost of $6.80 per pound, the bait to treat a group of pigeons during a 6 month (180 day) breeding period would cost approximately $1,224 for an 80-bird flock and $6,120 for a 400 bird flock (Innolytics 2007). This cost estimate does not include staff time required to appropriately apply the bait. Pigeons must be conditioned to the baiting program for a period of roughly 5-14 days. The site must be visually observed daily during the conditioning period to ensure that non-target species are not feeding on the bait and to accurately determine the amount of bait to be used. All bait should be consumed within one hour of application. Unconsumed bait must be collected at the end of the feeding period. During observation periods, applicator must remain on-site until all bait is consumed or removed from the site. After the conditioning period, the flock must be visually observed weekly to ensure that adequate amounts of bait are being provided, that all bait is being consumed and that non-target species have not started using the site. The product may not be applied if non-target species are observed eating the bait.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners, or where the presence of birds is a safety risk at or near airports. This method can be used with single nests for species such as hawks, or for colony nesting birds such as gulls. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations.

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Animal Behavior Modification: This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may include scare tactics or exclusion to deter or repel birds that cause loss or damage (Twedt and Glahn 1982). Some but not all devices used to accomplish this are:

- Exclusion (fencing and other barriers)
- Harassment including auditory scaring devices (*i.e.*, electronic guards, propane exploders, pyrotechnics, distress calls and sound producing devices), visual repellents/scare devices (lasers, scarecrows, falconry), and physical harassment (remote control devices, dogs)
- Chemical repellents (*i.e.*, mesurol, anthraquinone)

Exclusion

Exclusion involves physically blocking bird access to a site. Like habitat management, physical exclusion can provide a long-term nonlethal solution for deterring bird use of a structure or a site. Because of the cost involved in materials, construction and maintenance and the physical limitations of the systems, these methods are generally only practical for small areas and a limited number of species. Exclusion adequate to stop bird movements can also restrict movements of people, equipment and other wildlife (Fuller-Perrine and Tobin 1993). Some physical exclusion devices may be an impediment to the intended use of a site and some landowners, managers and users may consider the aesthetic impacts of

physical exclusion devices to be unacceptable. Physical exclusion methods may be prohibitively expensive for some locations. Physical exclusion methods which may be useful at off-airport sites include:

Bird Barriers - Bird proof exclusions can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which require overhead barriers as well as conventional perimeter netting. Buildings and other areas could be "bird proofed" using hardware cloth or netting. Heavy plastic strips hung vertically in open doorways have been successful in some situations in excluding birds (Johnson and Glahn 1994).

Perching Deterrents - Perching deterrents are available in a wide variety of designs (Internet Center for Wildlife Damage Management 2009). Porcupine wire (e.g., Nixalite™, Catclaw™) and coil wire are mechanical repellent methods that can be used to exclude pigeons and other birds from ledges and other roosting surfaces (Williams and Coorigan 1994, Avery and Genchi 2004). The sharp points inflict temporary discomfort on the birds as they try to land, which deters them from roosting. Drawbacks of this method are that some pigeons have been known to build nests on top of porcupine wires and the method can be expensive to implement if large areas are involved. Electric shock bird control systems are available from commercial sources and, although expensive, can be effective in deterring pigeons and other birds from roosting on ledges, window sills and other similar portions of structures (Williams and Corrigan 1994).

Surface Coverings - Some bird species may be excluded from ponds, fields or other areas using overhead wire grids (Pochop et al 1990, Fairaizl 1992, Lowney 1993). These lines should be made visible to the birds by hanging streamers or other objects at intervals along the wires. The objective is to discourage bird feeding activities and not cause bird injury or death. Overhead wire networks generally require little maintenance other than maintaining proper wire tension and replacing broken wires, and the spacing varies with the species being excluded. They have also been demonstrated to be most applicable on areas less than two acres, but may be considered unsightly or aesthetically unappealing to some people. Wire grids can render a pond unusable for boating, swimming, fishing, and other recreational activities. Installation costs are about $1,000 per surface acre for materials. The expense of maintaining wire grids may be burdensome for some people. Floating mats and balls approximately five inches in diameter can be used to cover the surface of a pond. Floating mats and "ball blankets" renders a pond unusable for boating, swimming, fishing, and other recreational activities.

Harassment

Harassment and frightening devices are those methods used to frighten birds away from an attractive resource. Harassment may be used in areas where physical exclusion and habitat management are not acceptable or feasible because of intended use of the site, perceived adverse aesthetic impacts of the habitat modification or exclusion device, or other site characteristics. Harassment may also be used as a short-term management alternative until more permanent methods (e.g., elimination of perching or nesting sites) can be implemented (Seamans and Helon 2006). Hazing with pyrotechnics, dogs, and lasers has become a popular means of repelling Canada Geese from urban and suburban sites such as parks, golf courses and cemeteries where there are problems with damage to vegetation and fecal contamination (Castelli and Sleggs 2000, Swift 2000, York et al. 2000, Holvinski et al. 2007, Preusser et al. 2008).

One of the primary limitations to the use of harassment programs is that birds often become accustomed to (habituated to) the frightening stimuli and may cease to respond to the stimulus(Bomford and O'Brien 1990). Birds may also learn to associate the stimulus with a particular person and vehicle and only attempt to use the site when the person/vehicle has left the site. Alternating and/or mixing frightening devices can help to reduce problems with habituation. Changing the location and the pattern (e.g., frequency of light and sound emission) of the frightening stimulus can also help problems with

habituation. There are fewer problems with physical harassment (e.g., harassment by a person, animal or remote-controlled device) than other forms of harassment because of the actual threat of contact, injury or capture by the source of the harassment).

Harassment systems do not eliminate the original attractant so birds are likely to try to return to the site and new birds may be attracted to the area unless some form of exclusion or habitat modification can be implemented (Holevinski et al 2007, Preusser et al. 2008). Holevinski et al (2007) found that geese hazed from an area using pyrotechnics returned to the area within 1-25 minutes. Using multiple techniques instead of only pyrotechnics will increase the chances of successful harassment (Holevinski et al 2007). In the study of an integrated harassment and egg-oiling program in Orange County, NY, geese did not move far from the areas in which they were being hazed (Preusser et al. 2008). Twelve of the 59 geese banded at one of the parks were observed at an unmanaged location 0.7 miles away on 161 occasions during the same year. While the number of geese utilizing the managed locations dropped, there was a corresponding rise in geese at unmanaged areas within 1.8 miles of the managed locations.

Acoustic Frightening Devices – This class of harassment methods may include propane exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations. Acoustic frightening devices are often not practical in suburban, urban or rural areas if they disturb people or pets. Pyrotechnics used as scare devices may be a temporary solution until geese become accustomed to the noise (Heinrich and Craven 1990). In addition, under large feedlot situations they may not be appropriate because of the disturbance to livestock, although livestock would eventually habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics (Bomford and O'Brien 1990).

Scarecrows - The use of scarecrows has had mixed results. These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972, Bomford and O'Brien 1990). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988). In general, scarecrows are most effective when they are moved frequently, alternated with other methods, and are well maintained.

Dogs - Dogs can be effective at harassing birds and keeping them off turf and beaches (Conover and Chasko 1985, Woodruff and Green 1995). Around water, this technique appears most effective when the body of water to be patrolled is ≤ 2 acres in size (Swift 1998). In New York, use of dogs was particularly effective when combined with remote controlled boats to harass geese that had moved into the water to avoid the dogs (Pecor et al. 2007). Although dogs can be effective in keeping birds off individual properties, they do not contribute to a solution for the larger problem of overabundant/anthropogenic abundant bird populations (Castelli and Sleggs 1998). Swift (1998) and numerous individuals in New York have reported that when harassment with dogs ceases, the number of birds usually return to pre-treatment numbers. WS has recommended and encouraged the use of dogs where appropriate.

Falconry - Falconry is the practice of using falcons and hawks to chasing/hunt other wildlife species and return to the handler. It is regulated under both Federal and State laws and all raptors in the United States are protected under various statutes; any "take" of a raptor must be done under the appropriate permit to be legal. The care and housing of falcons can be expensive (Chamorro and Clavero 1994) and there are drawbacks to using falcons to disperse birds from damage or potential damage sites (Hahn 1996) (*i.e.,* falcons are generally only flown when weather and lighting condition permit).

Laser - Lasers are a relative new technique used to frighten and disperse birds from their roosts or loafing areas. Although the use of a laser (the term of "laser" is an acronym for Light Amplification by Simulated Emission of Radiation) to alter bird behavior was first introduced nearly 30 years ago (Lustick 1973), it received very little attention until recently when it was tested by the NWRC. Results have shown that several bird species, such as double-crested cormorants, Canada geese, other waterfowl, gulls, vultures, and American crows have all exhibited avoidance of laser beams during field trails (Glahn et al. 2001, Blackwell et al. 2002). The repellent or dispersal effect of a laser is due to the intense and coherent mono-wavelength light that, when targeted at birds, can have substantial effects on behavior and my illicit changes in physiological processes (APHIS 2001). Best results are achieved under low-light conditions (*i.e.*, sunset through dawn) and targeting structures or tree proximate to roosting birds, thereby reflecting the beam. In field situations, habituation to lasers has not been observed (APHIS 2001).

The avian eye generally filters most damaging radiation (*e.g.*, short-wavelength radiation from the sun). In tests conducted with double-crested cormorants exposed to a relatively low-power Class-III B laser at a distance of 1 meter, no ocular damage was noted (APHIS 2001). However, unlike birds, the human eye, with the exception of the blink reflex, is essentially unprotected from thermal damage to retinal tissue associated with concentrated laser radiation. Lasers used by WS include the Class-III B, 5-mW, He-Ne, 633-nm Desman laser, and the Class II, battery-powered, 68-mW, 650-nm, diode Laser Dissuader. Because of the risk of eye damage, safety guidelines and specifications have been developed and are strictly followed by the user (Occupational Safety and Health Administration 1991, Glahn and Blackwell 2000).

Spotlights - The use of light to disturb or move loafing and or roosting birds can be an effective technique if the harassment is maintained over a long period of time (VerCauteren et al 2003). This method is similar to the laser, but has a much reduced price. The sacrifice in reduced pricing also limits the range and effectiveness of this method when compared to the laser.

Remote Control Devices - The use of remote control devices for the purpose of disturbing the activity or behavior of birds is a relatively new concept. These devices have been in existence for many years, but their durability, range, strength and cost have improved dramatically. Remote control devices are available in numerous forms such as: speed boats, helicopters, airplanes, sail boats, race cars, etc. Holevinski et al (2007) reported that in trials with the use of remote control boats and border collies they were able to remove >90% of geese 97% of the time; however the geese returned within 30 minutes.

Chemical Repellents

Bird repellents may be used to reduce bird feeding on plants, repel birds from temporary pools of standing water, and have been used as a tactile repellent to prevent perching on building ledges and similar locations. Products available for use include but are not limited to:

Methyl Anthranilate (MA) - MA is artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. MA is currently registered as a repellent to protect turf from bird grazing and as a spray for airport runways to reduce bird activity/risk on or near airports. It is also been investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or the FDA.

Mesurol - This chemical repellent is used for non-lethal taste aversion. It is registered by the EPA for aversive conditioning egg treatment to reduce predation from common ravens, white-necked ravens (*C. cryptoleucas*), and American crows on the eggs of protected, T/E species, or eggs of other species designated to be in need of special protection (EPA Reg. No. 56228-33). Mesurol is registered for WS use only. The active ingredient is methiocarb which is a carbamate pesticide which acts as a

cholinesterase inhibitor. Species which feed upon treated eggs may show signs of toxicity (*e.g.* regurgitation, lethargy, temporary immobilization). Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Avery et al. (1995) examined the potential of using eggs injected with 30mg of mesurol to condition ravens from preying on eggs of endangered California least terns (*Sterna antillarum*). The result concluded that proper deployment of treated eggs can be a useful, nonlethal method of reducing raven predation at least tern colonies. Avery and Decker (1994) evaluated whether predation might be reduced through food avoidance learning. They used captive fish crows to examine avoidance response from mesurol (18mg/egg) and MA (100mg/egg). Their conclusion showed that some crows displayed persistence to the 5-day exposure and that successful application may require extended period of training for target predators to acquire an avoidance response. During the spring of 2001, WS conducted a field test on the Sterling Wildlife Management Area in Bingham County, Idaho, where mesurol treated eggs were exposed to black-billed magpies (*Pica pica*) to evaluate aversive conditioning to eggs of waterfowl and upland game birds. Magpies feeding on treated eggs decreased after a short period of time, however, their feeding behavior switched to pecking holes in eggs, possibly trying to detect treated eggs before consuming them. This behavior may suggest that at least some birds experienced the ill effects of mesurol, but the *"tasting"* of eggs may result in increased predation (Maycock and Graves 2001).

Anthraquinone (Flight Control™) - Anthraquinone is a non-lethal repellent currently registered in the United States for use on geese. 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). Additional bird-repellent applications are being developed for rice and corn seed treatments and aerial application to ripening rice (Avery 2003). 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). Anthraquinone is a secondary repellent and affects birds by causing post-intestinal distress. Sometimes ingestion of anthraquinone-treated food produces vomiting, but often vomiting does not occur and the bird just sits quietly until the discomfort passes. Anthraquinone is not a taste repellent or contact irritant as the birds do not hesitate to eat treated food, and they exhibit no sign that treated food is unpalatable to them. However, once the birds experience the adverse consequences they learn to avoid the protected food.

Anthraquinone is a stable compound and virtually insoluble in water and there are no known hazards to non-target species from repellent application of anthraquinone. It is not phytotoxic and does not inhibit germination of rice seeds or growth of sprouts. It also has a very low toxicity to birds and mammals, and it appears to be innocuous to insects (Avery 2003). Anthraquinone is not registered for use in Ohio.

Tactile repellents - A number of tactile repellent products are on the market, which reportedly deters birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason et al. 1989). The repellency of tactile products is generally short-lived because of dust, and they sometimes cause aesthetic problems and expensive clean-up costs by running down the sides of buildings in hot weather. Tactile repellents are unsuitable for use with waterfowl and are unlikely to be useful on the scale needed to address off-airport problems with flocks of feeding and roosting blackbirds, crows, rock pigeons, or house sparrows. Consequently, this method is not being advanced for further analysis.

Other Chemical Repellents - A number of other chemicals have shown bird repellent capabilities and new nonlethal repellents may become available in the future. Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting Starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling starlings (Dolbeer et al. 1998). In the event that new repellents become available, WS will evaluate the products to

determine if they have potential environmental impacts which have not been addressed in the EA and supplement the analysis as appropriate in accordance with the NEPA.

Live Capture Methods can be used the WS program for disease surveillance, research, and damage management. Live-captured birds may be released on site (e.g., disease surveillance, research), relocated, or euthanized depending upon the species and circumstances of the project (see Relocation and Lethal Methods sections below). Non-target species may be captured in some of these devices, but in most cases it is possible to release non-target species unharmed.

Clover, Funnel, and Common Pigeon Traps
These traps are enclosure traps made of nylon netting or hardware cloth and come in many different sizes and designs, depending on the species of birds being captured. The entrances of the traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps are baited with grains or other food material, which attract the target birds. WS' standard procedure when conducting trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds.

Cage Traps
This category of traps represents a wide variety of traps including decoy traps and Swedish goshawk traps. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Swedish goshawk trap construction and use is described in Meng (1971). These traps are used to capture raptor species such as red-tailed hawks. They are most often used at airports to remove raptors that pose bird strike risks to aircraft, but can be used to remove individuals that are depredating on captive waterfowl or chickens. Birds caught in Swedish goshawk traps are most often relocated, but in some cases they are euthanized.

Nest Traps
Nest traps are used by WS to capture birds on a nest. Nest box traps are used to capture cavity nesters such as European starlings to prevent breeding activity by this non-native species. They can also be used to catch native birds such as American kestrels in sensitive areas such as airfields. Nest traps similar to funnel traps have been placed over the nests of ground nesting birds such as gulls to capture the adults.

Mist Nets
Mist nets are most commonly used for capturing small-sized birds such as house sparrows, finches, etc. but can be used to capture larger birds such as ducks and ring-neck pheasants (*Phasianus colchicus*). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net. Dho gazzas are net systems similar to mist nets. They are designed capture raptors.

Cast Nets, Landing Nets, and Hand Nets
These types of capture methods employ nets that are thrown or dropped over a target species. Hand nets are used to capture injured birds, or birds restrained in another larger type of trap (e.g., corral trap, or large cage traps. They are also used inside buildings to capture birds and remove them from public areas.

Powered Nets
Powered nets include bow nets and similar devices. They usually include a net attached to a round or square hinged, spring-loaded frame. One side of the frame is folded back and secured by a device attached to a trigger. When the trigger is released the frame springs back into place pulling the net over the bird. These devices can be trigged by a pan with bait attached to it or by remote control.

Propelled Nets
This category of capture devices includes cannon nets, rocket nets, Coda net guns (shoulder and ground mounted), and the Super Talon net gun. The cannon and rocket nets, and the Coda ground mounted system are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds, which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds which are typically shy to other types of capture. The net guns are usually used to capture species like gulls, waterfowl, and raptors. The Coda net guns use a blank .308 rifle cartridge for propulsion and the Super Talon uses compressed air cartridges for propulsion. The net is propelled from the shoulder-mounted or hand held device over the target.

Pole traps
Pole traps are generally set for raptors which perch on poles prior to making an attack. Problem hawks and owls can be safely trapped using a well-padded (*i.e.,* with foam rubber wrapped in electricians tape, surgical tubing) steel leg-hold trap (No. 1½ or other appropriate size), snare or tangle snares set on the top of poles. Poles that are 5 to 10-foot high near the threatened area where they can be seen easily and place one padded trap on top of each pole. The wire is run through the trap ring and the wire is secured to the pole and ground so that trapped birds may slide to the ground where the bird can rest. 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.

Bal-chatri Traps and Noose Mats
These traps are used for capturing birds of prey such as hawks and eagles. Live bait such as pigeons, starlings, rodents, etc. is used to lure raptors into landing on the trap (Hygnstrom and Craven 1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material and formed into a Quonset hut shape cage which holds the live bait. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string. Noose mats use a series of small nooses on a mat similar to nooses used on Bal-chatri traps and are used to live-capture shorebirds (Mehl et al. 2003).

Alpha chloralose (AC)
AC is a chloral derivative of glucose and a central nervous system depressant (*i.e.,* depresses cortical centers in the brain) used as an immobilizing agent to capture and remove waterfowl and other birds causing a nuisance, and for capture of birds for research purposes[12]. It is labor intensive and in some cases, may not be cost effective depending on the application and purpose (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts and for the capture of birds for research. Alpha chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans and the target birds. Single bread or corn baits are fed directly to the target birds. Wildlife Services personnel or other authorized personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Wildlife

[12] With proper use and follow-up, AC reduces the potential for stress, injury and death in many situations over other capture techniques.

Services is currently authorized by FDA to use AC to capture waterfowl, coots, pigeons and ravens under Investigative New Animal Drug (INAD) 6602 under a category of nuisance animals.

The solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. AC is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about 2 to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Wornecki et al. 1990) but the compound is not generally soluble in water and therefore should remain unavailable to aquatic organisms. Because of the method of delivery, water contamination is highly unlikely.

Relocation has been used with some success for low abundance species such as raptors (Section 4.4.1). Harassment techniques (e.g., pyrotechnics) generally are not effective in dispersing raptors from airports and killing raptors on airports to reduce strikes is generally not a recommended action because of their protected status and beneficial attributes (except when on airports). Relocation has also been attempted for more abundant species such as waterfowl (Cooper 1991, York et al 2001). In some of the waterfowl relocation programs, the project goals have included releasing the birds in sites where they are available for hunter harvest. In these programs, the increased mortality in relocated birds, including hunter harvest, likely plays an important role in the general efficacy of this method (Smith 1996, Cooper and Keefe 1997).

Smith (1996) reported that groups of juvenile geese relocated from urban to rural settings can effectively eliminate these geese from urban areas, retain them at the release site, include them in the sport harvest, and expose them to higher mortality. Smith (1996) also reported that multiple survival models indicated that survival estimates of relocated juveniles were half of those of urban captured and released birds. Hall and Groninger (2002) reported mortality rates of 19% for translocated geese in New Mexico (17.6% attributed to hunting). Mortality rates for geese captured and released on site instead of relocated were 14.2% (9.8% attributed to hunting). Woytek and Hestbeck (1997) reported that relocated goslings had higher recovery rates, lower survival and high fidelity to relocation areas in Minnesota than normal wild goslings. Ultimately, the relocation of resident waterfowl from metropolitan communities can assist in the reduction of overabundant populations (Cooper and Keefe 1997), and has been accepted by the general public as a method of reducing waterfowl populations to socially acceptable levels (Fairaizl 1992).

States like Minnesota and Michigan have used or are using programs which round-up urban waterfowl and give them to farms where the birds spend the rest of their lives. These programs have proven to be expensive for the state and have encountered difficulties with the sites which accept birds running out of room for new birds. Although individuals opposed to the use of lethal techniques may prefer this alternative, there are some people who feel that committing a wild bird to life in captivity is also inappropriate.

Despite some successes with Canada geese and raptors, relocation programs face numerous challenges. The method may not be cost effective for abundant species. Many problem bird species are highly mobile and can easily return to damage sites from long distances. Habitats in other areas may already be occupied, and relocation may result in bird damage problems at the new location. Additionally, few areas are likely to accept non-native species such as rock pigeons, house sparrows, mute swans, domestic ducks and European starlings. Relocation of resident birds, especially resident waterfowl has the potential to spread disease into populations of other resident birds and/or migrating waterfowl. The American Association of Wildlife Veterinarians, "...discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control." (AAWV

undated). Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of concerns pertaining to disease transmission, stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats, and the ability of some species to return to their original site.

LETHAL METHODS

Egg Addling/Oiling /Destruction: These techniques involve destroying the embryo prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen. The advantage of egg addling and egg oiling is that adult birds may continue to incubate the eggs even though they are not viable. This delay helps reduce the likelihood that the adults will re-nest.

Shooting with shotguns, air rifles, or rim and center-fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. All firearm safety precautions are followed by WS when conducting bird damage management activities, and laws and regulations governing the lawful use of firearms are strictly complied with. Shooting is a very individual specific method and is normally used to remove a single offending bird, or group of birds numbering less than 50 at one location. Shooting is more effective as a dispersal technique than as a way to reduce bird densities when a large number of birds are present. Shooting a few birds from a flock may be used to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required. It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling when permitted. When using shotguns, non-lead shot will be used to harass or take migratory birds at all times; however lead shot may be used to harass or take non-migratory bird species in non-wetland/riparian areas.

Firearm use is very sensitive issue and a public concern because of concerns relating to the misuse of firearms. To ensure safe firearms use and safety awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

DRC-1339, 3-chloro-4-methylbenenamine hydrochloride, is commonly used by ID WS (up to 100 applications annually) for management of various avian species. DRC-1339 is an avian toxicant registered with the EPA and by the ODA. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, crow, raven, magpie, and pigeon damage management (West et al. 1967, Besser et al. 1967, and Decino et al. 1966). It is a slow acting avicide that is rapidly metabolized and excreted after ingestion. Because of its rapid metabolism, DRC-1339 poses a discountable risk of secondary poisoning to non-target animals, including avian scavengers (Cunningham et al. 1979, Schafer 1984, Knittle et al. 1990). This compound is also unique because of its relatively high toxicity to most pest birds but low-to-moderate toxicity to most raptors and almost no toxicity to mammals (DeCino et al. 1966, Schafer 1991). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/ bird to cause death (Royall et al. 1967); many other bird species such as raptors, sparrows, and eagles are classified as non-sensitive (Schafer, Jr. 1981, Eisemann et al. 2003). Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and Threatened or Endangered (T/E) species (EPA 1995). Secondary poisoning has not been observed with DRC-1339

treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on birds killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, ultra violet radiation or water and is highly soluble in water but does not hydrolyze. DRC-1339 tightly binds to soil and has low mobility. The half-life is approximately 25 hours, which means it is nearly 100% broken down within a week. Identified metabolites (*i.e.*, degradation chemicals) have low toxicity. The EPA label prohibits using DRC-1339 baits directly in water or areas where runoff is likely.

Prior to the application of DRC-1339, pre-baiting is required to monitor for non-target species that may potentially consume treated baits, reducing potential exposure to non-target species. If non-target species are observed feeding on pre-bait, ID WS would postpone use of DRC-1339, terminate the proposed project until non-targets discontinue feeding at the site, change bait types to reduce its attractiveness to non-targets or select an alternative site. EPA labels for DRC-1339 prohibit use of the product in areas where potential consumption of treated baits by T/E species could occur. Baits may be in various forms, but the most common uses by ID WS are grains and cull French fries in feedlot/dairy applications and meat bait and boiled eggs for livestock depredation situations. DRC-1339 is typically used on both public and private lands in urban and rural areas for lethal control of starlings, blackbirds, pigeons, magpies, ravens and crows.

Avitrol is an avicide used as a damage management tool for house sparrows, blackbirds (red-winged, yellow-headed, and Brewer's blackbirds, grackles, cowbirds, European starlings), rock pigeons and crows. Avitrol® is a restricted-use pesticide that can only be sold to certified applicators, and is available in several bait formulations. Treated bait is mixed with untreated material to form a final bait formulation where only a small portion of the individual grains carry the chemical. For most species, dilution rates lower than a 1 to 9 ratio are not recommended or needed. For example, one of the formulations for use in pigeons notes that dilution rates of 1 to 29 can be effective in most situations (EPA Reg. No. 11649-7). For house sparrows, lower dilution rates such as 1 to 5 may be needed for particularly difficult problems (EPA Reg. No. 11649-6). The active ingredient (4-aminopyridine) acts on the central nervous systems and motor nervous systems. Birds display abnormal flying behavior after ingesting treated baits, become disoriented and emit distress vocalization (Roswell 1979, EPA 2007). There is variation among species in response to the product (e.g., pigeons generally do not vocalize) and in response to treated birds. Some species such as blackbirds appear to be highly responsive but others such as house sparrow and rock pigeons are less responsive (EPA 2007). In a study by Roswell et al. (1979), treated birds displayed depressive and dissociative anesthetic electro-encphalographic changes during course of action. These changes would appear to indicate that although the treated birds are behaving abnormally, they are not in pain. Behavior by treated birds usually deters the remaining birds from the site (EPA 2007). Birds that consume treated baits normally die.

An EPA Ecological Risks Assessment for avitrol (EPA 2007) identified the following potential ecological risks from avitrol use: risk of environmental contamination and local impacts on plants from avitrol which may be washed of bait during rain events, risks to animals which may drink water which has accumulated in avitrol bait stations during rainfall events, risks of direct consumption of avitrol by non-target species, and secondary hazards to predators which may consume animals which have eaten avitrol. The EPA evaluation was conducted using application as directed by the label and does not take into account additional precautions used by Idaho WS to reduce potential risks from the use of this product. Risks associated with use of avitrol broadcast on the ground and avitrol exposure to rainfall are eliminated because WS uses bait stations to administer avitrol. Wildlife Services personnel remain on site during

avitrol application and will not apply bait when it could be rained on unless the bait station is placed in a location where the bait will not be exposed to rainfall. Any bait left after a treatment will be disposed of in accordance with label directions. Current label requirements stipulate that the product must not be applied were non-target birds are feeding and that careful observations of the birds' feeding habits must be made to establish proper feeding locations and to determine that no non-target birds are feeding on pre-bait. In addition to pre-baiting, WS' use of bait stations and harassment of non-target species which may approach during bait application prevents risks of non-target species directly consuming treated bait. Consequently potential risks of primary toxicity, water contamination and plant exposure to avitrol from WS' use of this product are negligible.

There are three likely routes by which a predator or scavenger could be exposed to avitrol treated birds; through consumption of birds behaving erratically because they have consumed a toxic dose of avitrol, consumption of carcasses of birds killed with avitrol, and consumption of birds which had consumed a sub-lethal dose of avitrol. The EPA report discusses potential secondary hazards to predatory animals and references Ecological Incident Information System (EIIS) records of four predatory bird deaths, including one peregrine falcon , that were determined to be due to ingestion of poisoned birds (EPA 2007). In other states, WS has also received comments regarding a hypothesis that exposure to sub-lethal doses of avitrol may cause disorientation and contribute to building collision deaths of raptors in urban areas. In a study by Schafer et al. 1974, no effects were observed in predatory and scavenging species fed avitrol-treated blackbirds, but no information was available on the amount of avitrol in the blackbirds. The dose required to kill a blackbird is lower than for more resistant bird species such as pigeons. The EPA report noted that it would be possible for birds in the wild to consume more avitrol than the birds were fed in the laboratory studies. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning. However, in a field study, magpies and crows may have been affected secondarily (Schafer 1991). A laboratory study showed, though, that magpies which fed on birds killed with two to 3.2 times the lethal dose of active ingredient for 20 days were not affected (Schafer et al. 1974). As noted above, the EPA report considered risks from avitrol in light of label requirements not Idaho WS procedures to reduce risks. Risk of raptors catching and consuming birds behaving erratically because of avitrol poisoning is minimized by the presence of WS personnel at the treatment site who can harass any non-target birds, including raptors, which may approach the treatment area. WS patrols the area around the treatment site and collects and properly disposes of carcasses of birds killed with avitrol. Data from Schafer et al. (1991) indicate that avitrol is non-accumulative in tissues and rapidly metabolized by many species. Chronic toxicity has not been demonstrated (Schafer 1991). It is difficult to know the circumstances surrounding the mortality of the raptor species noted in the EIS. However it should be noted that most avitrol use is by private contractors who, while they may comply with label directions, may not employ the extra protective measures used by WS. Although mortality of individual non-target birds has occurred and is regrettable, to date, there has been no evidence of major non-target kills or adverse impacts on non-target species populations.

Avitrol® is water soluble and EPA expects the product to be both mobile and persistent in the open environment (EPA 2007). However, use of bait stations, the fact that WS will not use the product when it is raining, and adherence to label requirements for collections and proper disposal of unconsumed bait should prevent environmental contamination. Laboratory studies demonstrated that Avitrol® is strongly absorbed onto soil colloids and has moderately low mobility (Starr and Cunningham 1970, Starr and Cunningham 1975). Avitrol is expected to be stable under anaerobic conditions. Aerobic biodegradation is expected to be slow in soil and water, with a half-life ranging from 3 to 32 months (EPA 2007).

Snap Traps: Wooden based rat snap traps can be effective in killing offending birds, usually woodpeckers. The trap is nailed to the building with the trigger pointed downward alongside the area of the building sustaining the damage. The trap is baited with nut meats (walnuts, almonds, or pecans) or suet. If multiple areas are being damaged several traps can be used.

Carbon Dioxide (CO_2) Gas is a colorless, odorless, noncombustible gas approved by the AVMA as a euthanasia method (Beaver et al. 2001). CO_2 is a common euthanasia agent apparently because of its ease of use, safety, and ability to euthanize many animals in a short time span. The advantages for using CO_2 are: 1) the rapid depressant, analgesic, and anesthetic effects of CO_2 are well established, 2) CO_2 is readily available and can be purchased in compressed gas cylinders, 3) CO_2 is inexpensive, nonflammable, non-explosive, and poses minimal hazard to personnel when used with properly designed equipment, and 4) CO_2 does not result in accumulation of tissue residues. Carbon dioxide has been used to euthanatize mice, rats, guinea pigs, chickens, and rabbits, and to render swine unconscious before humane slaughter. Studies of 1-day-old chickens have revealed that CO_2 is an effective euthanatizing agent. Inhalation of CO_2 caused little distress to the birds, suppresses nervous activity, and induced death within 5 minutes. In addition, inhalation of CO_2 at a concentration of 7.5% increases the pain threshold, and higher concentrations of CO_2 have a rapid anesthetic effect.

Wildlife Services sometimes uses CO_2 to euthanize birds which have been captured in live traps, by hand, or by chemical immobilization and when relocation is not feasible. Live birds are placed in a container or chamber and CO_2 gas from a cylinder is released into the chamber. The birds quickly expire after inhaling the gas.

Cervical Dislocation is a method used to euthanize birds after they have been captured by other means. The bird is grasped by the legs and the neck is stretched by pulling on the head while applying a ventro-dorsal rotational force to the skull (AVMA 2013). The American Veterinary Medical Association considers this technique appropriate for birds under 3 kg.

Hunting

Wildlife Services sometimes recommends that resource owners consider legal hunting as an option for reducing game bird species damage. Although legal hunting is impractical and/or prohibited in many urban/suburban areas, it can be used to reduce some local populations of game birds. Legal hunting also reinforces harassment programs (Kadlec 1968).

APPENDIX C

USFWS LISTING OF THREATENED AND ENDANGERED SPECIES IN OHIO

Status	Species	Counties of Current, Recent, and Possible Distribution
E	Indiana Bat (*Myotis sodalis*)	All counties in Ohio
PE	Northern Long-eared Bat (*Myotis septentrionalis*)	All counties in Ohio
E	Kirtland's Warbler (*Setophaga kirtlandii*)	Ashtabula, Cuyahoga, Erie, Lake, Lorain, Ottawa, Sandusky
E	Piping Plover (*Charadrius melodus*)	Ashtabula, Cuyahoga, Erie (CH), Lake (CH), Lorain, Lucas, Ottawa, Sandusky
T	Rufa Red Knot (*Calidris conutus rufa*)	Ashtabula, Cuyahoga, Erie, Lake, Lorain, Lucas, Ottawa, Sandusky
E	Scioto Madtom (*Noturus trautmani*)	Franklin, Madison, Pickaway, Union
E	Clubshell (*Pleurobema clava*)	Ashtabula, Coshocton, Defiance, Franklin, Greene, Gancock, Hardin, Madison, Pickaway, Pike, Ross, Scioto, Trumbull, Union, Williams
E	Fanshell (*Cyprogenia stegaria*)	Adams, Athens, Brown, Clermont, Coshocton, Gallia, Hamilton, Lawrence, Meigs, Morgan, Muskingum, Scioto, Washington
E	Northern Riffleshell (*Epioblasma torulosa rangiana*)	Defiance, Fanklin, Madison, Pickaway, Pike, Ross, Scioto, Union, Williams
E	Pink Mucket Pearly Mussel (*Lampsilis abrupta*)	Adams, Athens, Brown, Clermont, Gallia, Hamilton, Lawrence, Meigs, Morgan, Scioto, Washington
E	Purple Cat's Paw Perly Mussel (*Epioblasma o. obliquata*)	Coshocton
E	Rayed Bean (*Villosa fabalis*)	Adams, Brown, Butler, Clark, Clermont, Coshocton, Darke, Defiance, Delaware, Franklin, Fulton, Greene, Hamilton, Hancock, Hardin, Logan, Lucas, Madison, Marion, Miami, Montgomery, Pickaway, Pike, Ross, Scioto, Shelby, Union, Warren, Williams, Wyandot
E	Sheepnose (*Plethobasus cyphyus*)	Adams, Athens, Brown, Clermont, Coshocton, Gallia, Hamilton, Lawrence, Meigs, Morgan, Muskingum, Scioto, Washington
E	Snuffbox (*Epioblasma triquetra*)	Adams, Ashtabula, Athens, Brown, Clermont, Coshocton, Delaware, Franklin, Gallia, Greene, Hamilton, Lake, Lawrence, Madison, Meigs, Miami, Montgomery, Morgan, Muskingum, Pickaway, ross, Scioto, Union, Washington
E	White Cat's Paw Pearly Mussel (*Epioblasma obliquata perobliqua*)	Defiance, Williams

Status	Species	Counties of Current, Recent, and Possible Distribution
T	Rabbitsfoot (*Quadrula c. cylindrica*)	Coshocton (PCH), Franklin, Madison (PCH), Muskinum, Pickaway, Union (PCH), Williams (PCH)
E	American Burying Beetle (*Nicrophorus americanus*)	Athens, Hocking, Morgan, Perry, Vinton
E	Karner Blue Butterfly (*Lycaeides melissa samuelis*)	Lucas
E	Mitchell's Satyr (*Neonympha m. mitchellii*)	Portage
E	Running Buffalo Clover (*Trifolium stoloniferum*)	Adams, Brown, Clermont, Hamilton, Hocking, Jackson, Lawrence, Ross, Scioto, Vinton, Warren
T	Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)	Clark, Holmes, Lucas, Ottawa, Sandusky, Wayne
T	Lakeside Daisy (*Hymenoxys herbacea*)	Erie, Ottawa
T	Northern Monkshood (*Aconitum noveboracense*)	Hocking, Portage, Summit
T	Small Whorled Pogonia (*Isotria medeoloides*)	Hocking, Scioto
T	Virginia Spiraea (*Spiraea virginiana*)	Scioto
T	Copperbelly Water Snake (*Nerodia erythrogaster neglecta*)	Defiance, Hardin, Williams

IMPORTANT NOTE: This list reflects data available as of December 2014, and will change as new data become available. For this reason, searches for listed species should not be limited to the counties noted above. Any decisions in that regard should be made only after calling USFWS (614-416-8993) for guidance.

APPENDIX D

ODW LISTING OF ENDANGERED AND THREATENED WILDLIFE SPECIES IN OHIO AS OF AUGUST 2014

Ohio's Endangered Species

Note: *E and *T denote federal (U.S. Fish and Wildlife Service) listed endangered and threatened species respectively

MAMMALS

Indiana Myotis *E	*Myotis sodalist*
Allegheny woodrat	*Neotoma magister*
Black bear	*Ursus americanus*

BIRDS

American bittern	*Botaurus lentiginosus*
Northern harrier	*Cirucs cyaneus*
King rail	*Rallus elegans*
Sandhill crane	*Grus canadensis*
Piping plover *E	*Charadrius melodus*
Common tern	*Sterna Hirundo*
Black tern	*Chlidonias niger*
Loggerhead shrike	*Lanius ludovicianus*
Kirtland's warbler *E	*Dendroica kirtlandii*
Lark sparrow	*Chondestes grammacus*
Snowy egret	*Egretta thula*
Cattle egret	*Bubulcus ibis*
Upland sandpiper	*Bartramia longicauda*

REPTILES

Copperbelly Watersnake *T	*Nerodia erythrogaster neglecta*
Plains gartersnake	*Thamnophis radix*
Timber rattlesnake	*Crotalus horridus*
Eastern massasauga	*Sistrurus catenatus*
Smooth greensnake	*Opheodrys vernalis*

AMPHIBIANS

Eastern hellbender	*Cryptobranchus allenganiensis allenganiensis*
Blue-spotted salamander	*Ambystoma laterale*Green
salamander	*Aneides aeneus*
Cave salamander	*Eurycea lucifuga*
Eastern spadefoot	*Scaphiopus holbrookii*

FISHES

Ohio lamprey	*Ichthyomyzon bdellium*
Northern brook lamprey	*Ichthyomyzon fossor*
Mountain brook lamprey	*Ichthyomyzon greeleyi*
Lake sturgeon	*Acipenser fulvescens*
Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Spotted gar	*Lepisosteus oculatus*
Shortnose gar	*Lepisosteus platostomus*
Cisco (or Lake herring)	*Coregonus artedi*
Goldeye	*Hiodon alosoides*
Shoal chub	*Macrhybopsis hyostoma*
Pugnose minnow	*Opsopoeodus emiliae*
Popeye shiner	*Notropis ariommus*
Longnose sucker	*Catostomus catostomus*
Northern madtom	*Noturus stigmosus*

FISHES CON'T

Scioto madtom *E	*Notutus trautmani*
Pirate perch	*Aphredoderus sayanus*
Western banded killifish	*Fundulus diaphanus menona*
Spotted darter	*Etheostoma maculatum*
Iowa darter	*Etheostoma exile*
Gilt darter	*Percina evides*

MOLLUSKS

Snuffbox	*Epioblasma triquetra*
Ebonyshell	*Fusconaia ebenas*
Fanshell *E	*Cyprogenia stegaria*
Butterfly	*Ellipsaria lineolata*
Elephant-ear	*Elliptio crassidens crassidens*
Purple catspaw *E	*Epioblasma obliquata obliquata*
White catspaw *E	*Epioblasma obliquata perobliqua*
Northern Riffleshell *E	*Epioblasma torulosa rangiana*
Long-solid	*Fusconaia maculata maculata*
Pink mucket *E	*Lampsilis orbiculata*
Sharp-ridged pocketbook	*Lampsilis ovate*
Yellow sandshell	*Lampsilis teres*
Eastern pondmussel	*Ligumia nasuta*
Washboard	*Megalonaias nervosa*
Sheepnose	*Plethobasus cyphyus*
Clubshell *E	*Pleurobema clava*
Ohio pigtoe	*Pleurobema cordatum*
Pyramid pigtoe	*Pleurobema rubrum*
Rabbitsfoot *T	*Quadrula cylindrica cylindrical*
Monkeyface	*Quadrula metanevra*
Wartyback	*Quadrula nodulata*
Purple lilliput	*Toxolasma lividus*
Rayed bean	*Villosa fabalis*
Little spectaclecase	*Villosa lienosa*

DRAGONFLIES

Hine's emerald *E	*Somatochlora hineana*
Mottled darner	*Aeshna clepsydra*
Plains clubtail	*Gomphus externus*
American emerald	*Cordulia shurtleffi*
Uhler's sundragon	*Helocordulia uhleri*
Frosted whiteface	*Leucorrhinia frigida*
Elfin skimmer	*Nannothermis bella*
Canada darner	*Aeshna canadensis*
Racket-tailed emerald	*Dorocordulia libera*
Brush-tipped emerald	*Somatochlora walshii*
Blue corporal	*Ladona deplanata*
Chalk-fronted corporal	*Ladona julia*
Yellow-sided skimmer	*Libellula flavida*

DAMSELFLIES

Lilypad forktail	*Ischnura kellcotti*
Seepage dancer	*Argia bipunctulata*

DAMSELFLIES CON'T

River jewelwing	*Calopteryx aequabilis*

CADDISFLIES

	Chimarra social
	Oecetis eddlestoni
	Brachycentrus numerosus

MAYFLIES

	Rhithrogena pellucida
	Litobrancha recurvate

MIDGES

	Rheopelopia acra

BUTTERFLIES

Persius dusky wing	*Erynnis persius*
Frosted elfin	*Callophrys irus*
Karner blue *E	*Lycaeides melissa samuelis*
Purplish copper	*Lycaena helloides*
Swamp metalmark	*Calephelis muticum*
Regal fritillary	*Speyeria idalia*
Mitchell's satyr *E	*Neonympha mitchellii*
Grizzled skipper	*Pyrgus centauraea Wyandot*

MOTHS

Unexpected cycnia	*Cycnia inopinatus*
Graceful underwing	*Catacala gracilis*
	Spartiniphaga inops
	Hypocoena enervata
	Papaipema silphii
	Papaipema beeriana
	Lithophane semiusta
	Trichoclea artesta
	Tricholita notate
	Melanchra assimilis
Pointed sallow	*Epiglaea apiata*
	Ufeus plicatus
	Ufeus satyricus
Herbard's noctuid moth	*Erythroecia hebardi*

BEETLES

Ohio cave beetle	*Pseudanophthalmus ohioensis*
American burying beetle *E	*Nicrophorus americanus*

ISOPODS

Fern cave isopod	*Caecidotea filicispeluncae*
Unnamed cave isopod	*Caecidotea sp. nov.*

PSEUDOSCORPIANS

Buckskin cave pseudoscorpian	*Apochthonius hobbsi*

Ohio's Threatened Species

Note: *E and *T denote federal (U.S. Fish and Wildlife Service) listed endangered and threatened species respectively

MAMMALS

Eastern harvest mouse	*Reithrodontomys humulis*

BIRDS

Black-crowned night heron	*Nycticorax nycticorax*
Barn owl	*Tyto alba*
Least bittern	*Ixobrychus exilis*
Peregrine falcon	*Falco peregrinus*
Trumpeter swan	*Cygnus buccinator*

REPTILES

Kirtland's snake	*Clonophis kirtlandii*
Spotted turtle	*Clemmys guttata*
Blanding's turtle	*Emydoidea blandingii*
Lake Erie watersnake	*Nerodia sipedon insularum*

AMPHIBIANS

Mud salamander	*Pseudotriton montanus*

FISHES

Brook trout	*Salvelinus frontinalis*
Bigeye shiner	*Notropis boops*
Tinguetied minnow	*Exoglossum laurae*
Greater redhorse	*Moxostoma valenciennesi*
Channel darter	*Percina copelandi*
American eel	*Anguilla rostrata*
Paddlefish *M	*Polyodon spathula*
Bigmouth shiner	*Notropis dorsalis*
Lake chubsucker	*Erimyzon sucetta*
River darter	*Percina shumardi*
Tippecanoe darter	*Etheostoma tippecanoe*
Blue sucker	*Cycleptus elongatus*
Mountain madtom	*Noturus eleutherus*

MOLLUSKS

Black sanshell	*ligumia recta*
Threehorn wartyback	*Obliquaria reflexa*
Fawnsfoot	*Truncilla donaciformis*
Pondhorn	*Unimerus tetralasmus*

CRAYFISHES

Sloan's crayfish	*Orconectes sloanii*
Cavespring crayfish	*Cambarus tenebrosus*

DRAGONFLIES

Riffle snaketail	*Ophiogomphus carolus*
Harlequin darner	*Gomphaeschna furcillata*Green-
faced clubtail	*Gomphus viridifrons*

DAMSELFLIES

Boreal bluet	*Enallagma boreale*
Northern bluet	*Enallagma cyathigerum*
Marsh bluet	*Enallagma ebrium*

CADDISFLIES

	Psilotreta indecisa
	Hydroptila albicornis
	Hydroptila artesa
	Hydroptila koryaki
	Hydroptila talledaga
	Hydroptila Valhalla

MIDGES

	Bethbilbeckia floridensis
	Apsectrotanypus johnsoni
	Radotanypus florens

BUTTERFLIES

Silver-bordered fritillary	*Boloria selene*

MOTHS

Wayward nymph	*Catocala antinympha*
	Spartiniphaga panatela
	Fagitana littera
The pink-streak	*Faronta rubripennis*

BEETLES

	Cicindela hirticollis
Cobblestone tiger beetle	*Cicindela marginipennis*

ISOPODS

Frost cave isopod	*Caecidotea rotunda*

Ohio's Species of Concern

MAMMALS

Pygmy shrew	*Sorex hoyi*
Star-nosed mole	*Condylura cristata*
Eastern small-footed bat	*Myotis leibii*
Rafinesque's big-eared bat	*Corynorhinus rafinesquii*
Little brown bat	*Myotis lucifugus*
Big brown bat	*Eptesicus fuscus*
Tri-colored bat	*Perimyotis subflavus*
Northern long-eared bat	*Myotis septentrionalis*
Woodland jumping mouse	*Napaeozapus insignis*
Badger	*Taxidea taxus*
Ermine	*Mustela erminea*
Smoky shrew	*Sorex fumerus*
Deer mouse	*Peromyscus maniculatus*
Prairie vole	*Microtus ochrogaster*
Woodland vole	*Microtus pinetorum*
Southern bog lemming	*Synamptomys cooperi*
Silver-haired bat	*Lasionycteris noctivagans*
Red bat	*Lasiurus borealis*
Hoary bat	*Lasiurus cinereus*
Snowshoe hare	*Lepus americanus*

BIRDS

Sharp-shinned hawk	*Accipiter striatus*
Sedge wren	*Cistothorus platensis*
Marsh wren	*Cistothorus palustris*
Henslow's sparrow	*Ammodramus henslowii*
Cerulean warbler	*Dendroica cerulea*
Prothonotary warbler	*Protonotaria citrea*
Black vulture	*Coragyps atratus*
Bobolink	*Dolichonyx oryzivorus*
Northern bobwhite	*Colinus virginianus*
Common moorhen	*Gallinula chloropus*
Great egret	*Ardea alba*
Sora rail	*Porzana carolina*
Virginia rail	*Rallus limicola*
Yellow-bellied sapsucker	*Sphyrapicus varius*

REPTILES

Eastern box turtle	*Terrapene carolina carolina*
Ouachita map turtle	*Graptemys ouachitensis*
Black kingsnake	*Lampropeltis getula nigra*
Eastern gartersnake (melanistic)	*Thamnophis sirtalis sirtalis*
Northern rough greensnake	*Opheodrys aestivus*
Eastern foxsnake	*Pantherophis gloydi*
Queensnake	*Regina septemvittata*
Little brown skink	*Scincella lateralis*
Smooth earthsnake	*Virginia valeriae*
Short-headed gartersnake	*Thamnophis brachystoma*
Eastern hognose snake	*Heterdon platirhinos*

AMPHIBIANS

Four-toed salamander	*Hemidactylium scutatum*
Eastern cricket frot	*Acris crepitans crepitans*

FISHES

Lake trout	*Salvelinus namaycush*
Lake whitefish	*Coregonus clupeaformis*
Burbot	*Lota lota*
Muskellunge	*Esox masquinongy*
River redhorse	*Moxstoma carinatum*

FISHES CON'T

Eastern sand darter	*Ammocrypta pellucida*
Least darter	*Etheostoma microperca*
Blue catfish	*Ictalurus furcatus*
Longnose dace	*Rhinichthys cataractae*

MOLLUSKS

Purple wartyback	*Cyclonaias tuberculate*
Wavy-rayed lampmussel	*Lampsilis fasciola*
Round pig-toe	*Pleurobema sintoxia*
Salamander mussel	*Simpsonaias ambigua*
Deertoe	*Truncilla truncate*
Elktoe	*Alasmidonta marginata*
Kidneyshell	*Ptychobranchus fasciolaris*
Creek heelsplitter	*Lasmigona compressa*

CRAYFISHES

Great Lakes crayfish	*Orconectes propinquus*
Northern crayfish	*Orconectes virilis*
Allegheny crayfish	*Orconectes obscurus*

DRAGONFLIES

Tiger spiketail	*Cordulegaster erronea*

MAYFLIES

	Maccaffertium ithica

CADDISFLIES

	Hydroptila Chattanooga
	Asynarchus montanus
	Nemotaulius hostilis

MIDGES

	Cantopelopia gesta

BUTTERFLIES

Two-spotted skipper	*Euphyes bimacula*
Dusted skipper	*Atrytonopsis hianna*

MOTHS

Milnei's looper moth	*Euchlaena milnei*
Buck moth	*Hemileuca maia*
One-eyed sphinx	*Smerinthus cerisyi*
Precious underwing	*Catacala pretiosa*
	Macrochilo bivittata
	Phalaenostola hanhami
	Paectes abrostolella
	Capis curvata
	Tarachidia binocula
	Apamea mixta
	Agroperina lutosa
Columbine borer	*Papaipema leucostigma*
Bracken borer moth	*Papaipema pterisii*
Osmunda borer moth	*Papaipema speciosissima*
	Chtonix sensilis
	Amolita roseola

MOTHS CON'T

Goat sallow	*Homoglaea hircine*
	Brachylomia algens
Purple arches	*Polia purpurissata*
Scurfy quaker	*Homorthodes furfurata*
	Trichosilia manifesta
	Agonopterix pteleae

BEETLES

Six-banded longhorn beetle	*Dryobius sexnotatus*
	Cicindela splendida
	Cicindela ancocisconensis
	Cicindela cursitans
	Cicindela cuprascens
	Cicindela macra

CRICKETS

Laricis tree cricket	*Oecanthus laricis*

Ohio's Species of Interest

MAMMALS

Evening bat	*Nycticeius humeralis*

BIRDS

Canada warbler	*Wilsonia canadensis*
Magnolia warbler	*Dendroica magnolia*
Northern waterthrush	*Seiurus noveboracensis*
Winter wren	*Troglodytes troglodytes*
Black-throated blue warbler	*Dendroica caerulescens*
Brown creeper	*Certhia americana*
Chuck-will's-widow	*Caprimulgus carolinensis*
Bell's vireo	*Vireo bellii*
Long-eared owl	*Asio otus*
Mourning warbler	*Oporonis philadelphia*
Northern saw-whet owl	*Aegolius acadicus*
Pine siskin	*Carduelis pinus*
Purple finch	*Carpodacus purpureus*
Red-breasted nuthatch	*Sitta canadensis*
Short-eared owl	*Asio flammeus*
Western meadowlark	*Sturnella neglecta*
Golden-crowned kinglet	*Regulus satrapa*
Blackburnian warbler	*Dendroica fusca*
Wilson's snipe	*Gallinago delicate*
Gadwall	*Anas strepera*
Green-winged teal	*Anas crecca*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Redhead	*Aythya americana*
Ruddy duck	*Oxyura jamaicensis*
American black duck	*Anas rubripes*
Wilson's phalarope	*Phalaropus tricolor*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Common raven	*Corvus corax*
Dark-eyed junco	*Junco hyemalis*
Yellow-crowned night-heron	*Nyctanassa violacea*
Hermit thrush	*Catharus guttatus*
Least flycatcher	*Empidonax minimus*

BUTTERFLIES

Olympia marble	*Euchloe olympia*

MOTHS

Slender clearwing	*Hemaris gracilis*
	Sphinx lucitosa
	Tathorhynchus exsiccatus
	Catocala marmorata
Subflava sedge borer moth	*Archanara subflava*
	Caradrina meralis
	Calophasia lunula
	Leucania insueta
	Protorthodes incincta
Variegated orange moth	*Epelis truncataria*

APPENDIX E

WILDLIFE SERVICES SECTION 7 CONSULTATION WITH USFWS AND USFWS RESPONSE

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

6929 Americana Prkwy
Reynoldsburg, OH 43068

(614) 861-6087
(614) 861-9018 FAX

November 21, 2013

Mary Knapp, Ph.D.
Ecological Services Field Supervisor
USFWS-Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230

Dear Dr. Knapp:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) requests informal consultation regarding the effects on threatened and endangered (T&E) species from a proposed program to conduct bird damage management in Ohio. WS is conducting this consultation as part of the development of an Environmental Assessment (EA) on bird damage management in Ohio. This letter includes descriptions of the three alternatives that are being analyzed in detail in the EA (Appendix A), and a list of example bird damage problems typically addressed by WS in Ohio (Appendix B). Appendix C contains detailed descriptions of the bird damage management methods that would be used and/or recommended by WS.

We have evaluated our proposed action in relation to the potential impacts it may have on T&E species occurring in the State. The U.S. Fish and Wildlife Service's (USFWS) 1992 programmatic Biological Opinion is pertinent to this review, because WS is following all of the applicable "Reasonable and prudent alternatives" and "Reasonable and prudent measures" to preclude jeopardy and minimize the risk of incidental take of a listed species from that consultation. In addition, WS intends to fully comply with the guidance and dictates provided by the USFWS Region 3 and the Ohio Department of Natural Resources (ODNR), Division of Wildlife for management of birds.

Project Area

The analysis area being considered for purposes of this evaluation consists of all lands in Ohio.

Proposed Action

WS proposes to continue the current damage management program that responds to bird damage in the State of Ohio. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce bird damage to human health and safety (including threats to aviation and disease transmission risks), property, agriculture (including aquaculture, field crops, and livestock), and natural resources. Damage management would be conducted on public and private lands in Ohio when the property owner or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of

preventing or reducing damage while minimizing the harmful effects of damage management measures on humans, target and non-target species, and the environment. Under the proposed action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods. When appropriate, physical exclusion, habitat modification, or harassment would be recommended and utilized to reduce damage. In other situations, birds would be humanely removed using: shooting, trapping, and registered pesticides. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where the application of lethal methods alone would be the most appropriate strategy.

Analysis of Potential Impacts to Listed Species

The primary potential for impacts to any listed species would be associated with accidental injury or death of a non-target listed species during efforts to protect human safety, property, agriculture, or natural resources from damage or threats associated with birds.

According to the lists provided by the USFWS website accessed 7/29/2013 (http://www.fws.gov/midwest/Endangered/lists/ohio-spp.html), the following federally-listed species may occur within the State of Ohio:

Mammals		
Indiana bat	(*Myotis sodalist*)	Endangered
Northern long-eared bat	(*Myotis septentrionalis*)	Candidate
Birds		
Piping plover (Great Lakes Watershed – Also Critical Habitat)	(*Charadrius melodus*)	Endangered
Kirtland's warbler (during migration)	(*Dendroica kitlandii*)	Endangered
Rufa Red Knot	(*Calidris canutus rufa*)	Candidate
Whooping crane	(*Grus Americana*)	Nonessential Experimental Population
Reptiles		
Copperbelly water snake	(*Nerodia erythrogaster neglecta*)	Threatened
Eastern Massassauga	(*Sistrurus catenatus*)	Candidate
Fish		
Scioto Madtom	(*Noturus trautmani*)	Endangered
Insects		
American burying beetle	(*Nicrophorus americanus*)	Endangered
Karner blue butterfly	(*Lycaeides Melissa samuelis*)	Endangered

Mitchell's satyr butterfly	(*Neonympha mitchelli mitchelli*)	Endangered
Mussels		
Clubshell	(*Pleurobema clava*)	Endangered
Fanshell	(*Cyprogenia stegaria*)	Endangered
Northern riffleshell	(Epioblasma torulosa rangiana)	Endangered
Pink mucket pearlymussel	(*Lampsilis abrupta*)	Endangered
Purple cat's paw	(*Epioblasma obliquata obliquata*)	Endangered
Rabbitsfoot	(*Quadrula cylindrical cylindrical*)	Proposed
(Proposed critical habitat)		Threatened
Rayed bean	(*Villosa fabalis*)	Endangered
Sheepnose mussel	(*Plethobasus cyphyus*)	Endangered
Snuffbox mussel	(*Epioblasma triquetra*)	Endangered
White cat's paw	(*Epioblasma obliquata perobliqua*)	Endangered
Plants		
Eastern prairie fringed orchid	(*Platanthera leucophaea*)	Threatened
Lakeside daisy	(*Hymenoxys herbacea*)	Threatened
Northern monkshood	(*Aconitum noveboracense*)	Threatened
Running buffalo clover	(*Trifolium stoloniferum*)	Endangered
Virginia spiraea	(*Spiraea virginiana*)	Threatened
Small whorled pogonia	(*Isotria medeoloides*)	Threatened

Description of Wildlife Services Impacts

No Effect

The proposed WS bird damage management program would rarely be conducted in habitat used by copperbelly watersnake, Eastern massauga, Karner blue butterfly or Mitchell's satyr butterfly and will not result in the direct take of or alternation of habitat for these species. Wildlife Services would not propose the use of nonlethal bird repellents on plants in habitats where Karner blue butterfly or Mitchell's satyr butterfly occur. Similarly, the proposed action is not likely to result in the direct take or habitat alteration for aquatic organisms including Scioto madtom, clubshell, fanshell, Northern riffleshell, pink mucket pearlymussel, purple cat's paw, rabbitsfoot, rayed bean, sheepnose, snuffbox or white cat's paw mussel. All WS pesticides proposed for use in this EA would only be used, stored and disposed of in accordance with label instructions which prevent the contamination of aquatic systems. Therefore, we conclude that the proposed action will have no effect on copperbelly watersnake, Eastern massauga, Scioto madtom, clubshell, fanshell, Northern riffleshell, pink mucket pearlymussel, purple cat's paw, rabbitsfoot, rayed bean, sheepnose, snuffbox or white cat's paw mussel.

Not Likely to Adversely Affect

I am requesting USFWS concurrence that the WS OH bird damage management program is not likely to adversely affect the following listed species or their critical habitat:

Indiana Bat and Northern Long-eared Bat
In Ohio, Indiana bats and Northern long-eared bats generally hibernate in caves and abandoned mines from October –April. Summer habitat may consist of riparian, floodplain, or upland forests. In summer, these bats may roost in trees with sloughing/ exfoliating bark, cavities or split trunks or branches. Dead or dying trees of many species of trees are used including cottonwood and elm. Live trees of some species such as shagbark/shellbark hickory, silver maple and white oak trees may also be used. Maternity roost trees are generally 16 inches dbh or greater.

As discussed in Appendix C, the WS program rarely conducts tree removal or substantial habitat alteration activities although the program may recommend these practices to landowners, particularly for the reduction of bird hazards to aircraft. In general, these types of activities are conducted by the landowner/manager who is responsible for meeting all regulatory requirements for the action including compliance with the ESA.

WS' recommendations that include habitat management to reduce bird damage would be modified to comply with the USFWS recommended restrictions on tree removal. Removal of trees potentially used by Indiana bats would not be conducted or recommended from April 1- September 30. Additionally, Wildlife Services will consult with the USFWS prior to removing potential maternity roost trees (trees greater than 16 inch dbh) or surrounding vegetation such that the tree is left isolated. Based on the information provided and proposed protective measures, WS concludes the proposed action may affect but is unlikely to adversely affect Indiana bats.

Piping Plover and Red Knot
Piping plovers nest on open sandy beaches along the shores of the Great Lakes, however the last nesting record in Ohio was in 1942. Migrants, which typically use open mudflats, may still be found in Ohio. The FEIS for the WS program (USDA 1997 revised) and the USFWS' July 28, 1992 BO (Appendix F in USDA 1997 revised) reviewed and analyzed WS' programmatic activities and those documents support the not likely to adversely affect determination for piping plover. Additionally, the BO concluded that the potential impacts of WS' activities could be beneficial as gull control could reduce competition for potential nesting sites.

Red knots fly extensive migratory distances, and hence, may be found on Ohio shores during migration. Unlike the piping plover, however, they do not nest in Ohio.

Under the proposed action, WS may specifically target certain species of shorebirds, particularly during disease monitoring and surveillance activities. To further ensure minimal impact to piping plovers and red knots, the following conservation measures will be conducted:

1. WS will confer with the USFWS and ODNR to identify locations and activities of piping plovers and red knots prior to establishing shorebird capture sites.

2. Nets will not be set up within 100 feet of an observed piping plover or red knot.

3. Nets will be set up in such a manner as to minimize the chance of inadvertent capture of piping plovers and red knots, and will be disabled if piping plovers or red knots are observed in the vicinity of the trap site until the bird(s) leave the area.

4. Nets will be observed, and if a piping plover or red knot is inadvertently caught, it will be immediately removed and released on site.

Additionally, WS' bird damage management activities will not result in the destruction or adverse modification of piping plover critical habitat in Ohio. Given the above information, we conclude that the proposed action may affect but is unlikely to adversely affect piping plovers and red knots.

Kirtland's Warbler

The Kirtland's warbler has very narrow nesting habitat parameters and does not nest in Ohio. It is likely that all or nearly all of the population passes through Ohio during migration, however only one or two are detected most years, typically in the spring. The limited sightings are likely due to the possibility that the Kirtland's warbler makes the migration in one long flight. WS personnel are trained in the proper identification of bird species and should a Kirtland's warbler be observed WS would confer further with the USFWS and ODNR to minimize the potential for effects.

As noted in Appendix C, the WS program rarely conducts habitat management to reduce damage by birds. Most habitat management actions are implemented by the landowner/manager who is responsible for compliance with all applicable local, state and federal regulations including the ESA. The USFWS has indicated that shrub/scrub and forest habitat within 3 miles of Lake Erie may be important to migrating Kirtland's warblers. Within 3 miles of Lake Erie, WS will give preference to methods which do not result in alteration of shrub/scrub or forest habitat where practical and effective. If clearing of suitable habitat cannot be avoided, WS will contact the USFWS for further coordination. Based on the information above, we conclude the proposed action may affect but is unlikely to adversely affect Kirtland's warblers.

Whooping Crane

Any whooping cranes found in Ohio are part of a Nonessential Experimental Population (NEP). The Final Rule establishing the NEP was published in the Federal Register on June 26, 2001. The Final Rule designates a whooping crane NEP within a 20-state area in the eastern U.S. The intent is to establish a migratory flock which would summer and breed in central Wisconsin, migrate, and winter in west-central Florida.

The FEIS for the APHIS-WS program (USDA 1997 revised) and the USFWS' July 28, 1992 BO (Appendix F in USDA 1997 revised) reviewed and analyzed WS' programmatic activities and those documents support the not likely to adversely affect determination for the whooping crane.

American Burying Beetle
Wildlife Services' actions are not expected to result in substantive alteration of habitat used by American burying beetle, nor are they expected to result in the direct take of the beetles. When not engaged in brood-rearing, adults feed on a broad range of available carrion, and may also capture and consume live insects. The beetles use small vertebrates during brood rearing (optimum weight between 100 and 200 grams) (USFWS 1991). There is potential for beetles to be exposed to chemical methods used for bird damage management.

The avicide DRC-1339 is used by the Ohio WS program primarily for starling damage management at dairies and feedlots. Most use of DRC-1339 occurs during fall and winter months when the starling form feeding flocks which may congregate at dairies feedlots and other locations. The Ohio WS program may also use DRC-1339 in city and urban situation to address conflicts with pigeons. Risks associated with DRC-1339 are expected to be negligible because the compound is a slow acting avicide that is rapidly metabolized and excreted after ingestion (Appendix C, USDA 1997 revised). Because of its rapid metabolism, DRC-1339 is metabolized in birds by the time they die and does not accumulated in plant or animal tissues. DCR-1339 also quickly breaks down in anaerobic and aerobic soils. The product is somewhat volatile and is susceptible to degradations by both ultraviolet radiation and heat. A copy of the risk assessment for DRC-1339 (USDA 1997 revised) is attached.

Given the above information, WS concludes that the proposed use of DRC-1339 may affect but is unlikely to adversely affect American burying beetle.

Mesurol is a chemical repellent is registered by the EPA for aversive conditioning egg treatment to reduce predation from common ravens, white-necked ravens (*C. cryptoleucas*), and American crows on the eggs of protected, T/E species, or eggs of other species designated to be in need of special protection (EPA Reg. No. 56228-33). Species which feed upon treated eggs may show signs of toxicity (*e.g.* regurgitation, lethargy, temporary immobilization). Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Avitrol, 4-aminopyridine, is a toxicant which could be used as a damage management tool for house sparrows, blackbirds (red-winged, yellow-headed, and Brewer's blackbirds, grackles, cowbirds, European starlings), rock pigeons and crows. Both methods are described in detail in Appendix C. The Ohio WS program has not used either product and does not anticipate needing to use them in the future. They are being considered in the EA for potential use in the unlikely event that other methods are unsuccessful or undesirable for use in resolving damage. To prevent potential adverse impact on American burying beetle, the Ohio WS program will initiate consultation with the USFWS prior to using the products in counties where the beetles may occur. At the time of the consultation these counties included Athens, Hocking, Morgan, Perry and Vinton Counties.

Plants
WS' proposed action is not likely to adversely affect running buffalo clover (open forest/prairie edge), lakeside daisy (dry, rocky prairie grassland), Northern wild monkshood (stream sides, shaded cliffs, talus slopes), Eastern prairie fringed orchid (mesic prairie, sedge meadows, marsh edges, bogs), Virginia spiraea (along rivers and

streams), or small whorled pogonia (hardwood stands of beech, birch, maple, oak, and hickory). A very small proportion of WS OH bird damage management activities occur within the preferred habitats of these plant species. If WS implements habitat modification or physical disturbance caused by WS personnel walking through these species' habitats, WS would confer with the USFWS and the landowner to avoid impacting the species. WS personnel are aware of the names, preferred habitat, known locations in OH, and physical appearance of these plant species.

Conclusion

In summary, I have reviewed the federal list of threatened, endangered, and candidate species in relation to the bird damage management program proposed by WS in Ohio. I have concluded the proposed action may affect but will not adversely affect the Indiana bat, piping plover, Kirtland's warbler, whooping crane, American burying beetle, running buffalo clover, lakeside daisy, Northern wild monkshood, Eastern prairie fringed orchid, Virginia spiraea, and small whorled pogonia. Any planned WS bird damage management actions would be conducted in accordance with relevant laws, regulations, policies, orders, and procedures including permits issued by USFWS and ODNR or pursuant to other authorities (such as a Depredation Order) and the provisions noted above for the protection of federally-listed species. I am requesting your concurrence with this determination. Hopefully you can reply by December 23, 2013. Please contact me at (614) 861-6087 if you have any questions or if I can provide further information.

Sincerely,

Andrew J. Montoney
State Director, Ohio Program
USDA-APHIS-WS

APPENDIX A

ALTERNATIVES ANALYZED IN DETAIL IN THE ENVIRONMENTAL ASSESSMENT

Alternative 1 - Continue the Current WS Adaptive Integrated Bird Damage Management Program (No Action/Proposed Action).

The current and proposed program is an adaptive integrated Ohio WS bird damage management program for the protection of agricultural and natural resources, aquaculture, property, and public health and safety. Wildlife Services would continue to respond to requests for assistance with, at a minimum, technical assistance, or where appropriate and permitted by the USFWS and ODNR, operational damage management. The IWDM approach would allow for the use of legally available nonlethal and lethal bird damage management methods, either singly or in combination, to meet requester needs for reducing bird damage (Appendix C). Agricultural producers, airport managers, property owners and others requesting assistance would be provided information regarding the use of effective non-lethal and lethal techniques, as appropriate. Preference will be given to the use of nonlethal methods where practical and effective. Non-lethal methods include, but are not limited to, lure crops, environmental/habitat/behavior modification, decoy traps and other live traps, exclusionary devices, nest destruction, chemical repellents, reproductive inhibitors, and alpha chloralose (AC). Lethal methods considered by WS include: shooting, egg addling/ destruction, snap traps, DRC-1339, and euthanasia techniques, such as CO_2. WS may recommend hunting or DPs to resource owners when these methods are deemed applicable to certain bird damage management situations. Bird damage management would be conducted on private or public property where a need has been documented, WS assistance has been requested, and an *Agreement for Control* or other comparable document has been completed. All management actions would comply with applicable State, Federal and local laws and regulations.

Alternative 2 – Only Non-lethal Bird Damage Management.

This alternative would require WS to only use and recommend non-lethal methods to resolve bird damage problems. Appendix C provides a detailed description of nonlethal damage management methods available to WS. Requests for information regarding lethal management approaches would be referred to the ODNR, USFWS, extension agents, local animal control agencies, or private businesses or organizations. Individuals could choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, request WS operational 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 USFWS and ODNR regarding the issuance of permits to resource owners to allow them to take birds by lethal methods. Currently, the avicide DRC-1339 and the sedative Alpha Cloralose are only available for use by WS employees and use of these chemicals by private individuals would be illegal. Wildlife Services would not use DRC-1339 under this alternative. However, the avian toxicant Starlicide is similar to DRC-1339 and would remain available to licensed pesticide applicators. Alpha Chloralose would only be used by WS personnel to capture and relocate birds. Alpha chloralose would not be used for projects which involve live-capture followed by euthanasia.

Alternative 3 - No WS Bird Damage Management Program.

This alternative would terminate WS involvement in bird damage management (operational and technical assistance) on all land classes in Ohio. WS would not be available to provide technical assistance to livestock producers, airport and landfill managers, property owners or others requesting assistance. However, State and local agencies, and private individuals could conduct bird damage management. The products DRC-1339 and Alpha Chloralose are only available for use by WS employees. However, the avian toxicant Starlicide is similar to DRC-1339 and would remain available to licensed pesticide applicators.

APPENDIX B

EXAMPLE/TYPICAL BIRD DAMAGE PROBLEMS ADDRESSED BY WS IN OHIO

1. **Disease transmission**. Birds can be vectors of diseases that can be transmittable to humans or they may act as reservoirs for a disease which subsequently infects a host that spreads the disease to humans.

2. **Aviation safety.** Bird collisions with aircraft (bird strikes) kill birds, damage aircraft and pose a serious risk to public safety. Between 1990 and 2009 there were 11,110 wildlife strikes in the U.S. that caused damage to aircraft, of these 92% were caused by birds (Dolbeer et al. 2011).

3. **Property damage.** Property damage caused by birds can entail numerous resources such as woodpecker damage to residential dwellings or house sparrows and starlings may damage buildings by pecking foam insulation and create aesthetic problems with their droppings and nesting materials. Instances of property damage from birds may include Canada Geese defacing property due to overgrazing and deposition of large amounts of fecal material. Birds can also cause damage to electrical utility structures.

4. **Livestock feed.** Bird damage to agricultural crops has cost U.S. farmers more than $100 million annually (Besser 1985) and can pose significant economic threats to agricultural producers (Besser et al. 1968, Dolbeer et al. 1978, Feare 1984). Cattle in feedlots and dairies provide a tremendous feeding opportunity for birds. Starlings and other birds may select for grains found in cattle silage, thereby altering the composition and energy value of the feed.

5. **Aquaculture resources.** Bird damage to aquaculture resources can have significant economic impacts. Hoy et al. (1989) estimated that wading birds feeding at a minnow facility may consume $0.10 to $1.12 per bird which could translate into a loss in excess of $10,000 for a three month period. In a survey of fish hatcheries in the eastern United States, Parkhurst et al. (1987) estimated that most hatcheries lost in excess of $7,600 worth of fish production to bird predation annually.

6. **Field crops.** Canada Geese and blackbirds can cause considerable damage to field crops.

7. **Livestock health.** Pigeons, starlings, sparrows, and blackbirds have been implicated in the transmission of diseases significant to livestock production. Pigeons and starlings have been shown to be vectors of transmissible gastroenteritis (TGE) virus of swine. Cryptococcosis is a fungal disease spread by pigeons and starlings to livestock that may result in chronic, usually fatal, meningitis.

8. **Nuisance problems.** Certain bird species and their associated nesting material and droppings may create nuisances or safety hazards. Accumulations of pigeon droppings may produce an objectionable odor. Pigeon manure deposited on park benches, cars, statues, and unwary pedestrians is aesthetically displeasing. House Sparrows may also create fire hazards by placing nesting material near electrical wiring and light fixtures. Gulls create nuisances when they nest on roof tops and attempt to gain food from people

eating outdoors (Dolbeer et al. 1990). Excessive amounts of gull droppings on other structures, such as an USACE river lock, can cause slippery walking conditions and pose human safety threats after rainfall. Additionally, fecal accumulations from starlings have caused a slipping hazard on catwalks at industrial plants (along with a fire hazard at oil refineries).

9. **Natural resources.** Encroachment by some bird species is a concern of some resource management agencies. Starlings usurp nest sites from Wood Ducks (*Aix sponsa*), bluebirds (*Sialia* spp.), woodpeckers, and many other cavity nesters (Grabill 1977, Weitzel 1988, Ingold 1989). Brown-headed Cowbirds parasitize songbird nests, leading to concern by some wildlife biologists for the well-being of neotropical migrant species (Brown 1994).

APPENDIX C

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE IN OHIO

The most effective approach to resolving wildlife damage problems is to integrate the use of several methods, either simultaneously or sequentially. Integrated Wildlife Damage Management would integrate and apply practical methods to prevent and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on humans, other species, and the environment. Integrated Wildlife Damage Management may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these depending on the characteristics of specific damage problems.

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

A variety of methods (Table C-1) are potentially available to the WS program in Ohio for the management or reduction of bird damage. WS develops and recommends or implements IWDM strategies based on resource management, physical exclusion and wildlife management approaches. Within each approach there may be a number of specific methods or tactics available.

Various Federal, State, and local statutes and regulations and WS Directives govern WS use of damage management tools and substances. The following methods and materials are recommended or used in technical assistance and operational damage management efforts of the

Table C-1. Bird Damage Management Methods which would be Recommended or Used by WS under each Alternative.

Management Method	Alternative 1 Current Program	Alternative 2 Only Nonlethal	Alternative 3 No Program
Habitat Management	✓	✓	No
Lure Crops/Cultural	✓	✓	No
Human Behavior	✓	✓	No
Exclusion	✓	✓	No
Frightening Devices	✓	✓	No
Repellents	✓	✓	No
Reproductive Inhibitors	✓[1]	✓[1]	No
Live Traps	✓	✓	No
Alpha-chloralose [2, 3,4]	✓	✓	No
Egg oil/addle/destruction	✓	No	No
Shooting	✓	No	No
DRC-1339 [2, 3]	✓	No	No
Avitrol®	✓	No	No
Euthanasia	✓	No	No
Hunting/DPs	✓	No	No

1 Depends on legal availability of this method in Ohio.
2 Only certified applicators could use.
3 Only registered for USDA-APHIS-WS use.
4 When used as a nonlethal technique birds captured with AC would not be killed.

WS program in Ohio. The effectiveness of the program can be defined in terms of reduced economic losses, decreased health hazards, minimized property damage and overall improved quality of life.

NONLETHAL METHODS

Resource Management: Resource management includes a variety of practices that may be used by resource owners to reduce the potential for wildlife damage. These practices may include indoor feeding of livestock, changing flight patterns to avoid times of high bird activity, and removing habitat features that are attractive to damaging species.

Alter Aircraft Flight Patterns
In cases where the presence of birds at airports results in threats to air traveler safety and when such problems cannot be resolved by other means, the alteration of aircraft flight patterns or schedules may be recommended. However, altering operations at airports to decrease the potential for hazards is not feasible unless an emergency situation exists. Otherwise, the expense of interrupted flights and the limitations of existing facilities make this practice prohibitive

Cultural Methods
These generally involve modifications to the level of care or attention given to the resource, which may vary depending on the age, size, and location of the resource. Husbandry practices include but are not limited to techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994). Cultural methods may also include selection of crops/plants which are not as attractive to foraging birds or selecting short-season crops which can be harvested before migration season.

Environmental/Habitat Modification
Habitat modification is an integral part of bird damage management. The type, quality, and quantity of habitat are directly related to the wildlife that use that habitat. Therefore, habitat can be managed to not attract certain bird species or even to repel certain birds. Most habitat management revolves around airports and bird aircraft strike problems in Ohio. Habitat management around airports is aimed at eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water on the airfield. Habitat management is often necessary to minimize damage caused by blackbirds and starlings that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand. Roosts often will re-form at traditional sites, and substantial habitat alteration is the only way to permanently stop such activity (USDA 1997 revised). Habitat management practices are usually conducted by the landowner/manager who is responsible for compliance with all applicable local, state and federal regulations including the ESA.

Human Behavior Management
Human behavior management involves educating and encouraging members of the public to engage in behaviors which minimize the risk of conflicts with wildlife. These behaviors may include encouraging people to not feed birds at parks and other locations, and helping municipalities establish regulations prohibiting bird feeding at parks and other public areas. It may also include public education on the importance of proper waste disposal, encouraging the use of trash receptacles that restrict access by birds

Lure Crops/Alternate Foods
When depredations cannot be avoided by careful crop selection or modified planting schedules, lure

crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area.

For lure crops to be effective, the ability to keep birds from surrounding fields would be necessary, and the number of alternative feeding sites must be minimal (Fairaizl and Pfeifer 1988). Additionally, lure crops reduce damage for only a short time (Fairaizl and Pfeifer 1988). The resource owner is limited in implementing this method contingent upon ownership of, or otherwise ability to manage the property. Unless the original bird-human conflict is resolved, creation of additional habitat or feeding sites could increase future conflicts.

Lure crops would likely be planted on some land held in private ownership, such as conservation clubs, throughout Ohio. These plantings may provide some additional food or act as an attractant for birds. However, it is highly unlikely they contribute to conflicts with birds or act as significant attractants when one considers that millions of acres of the State are in corn, wheat, hay and soybean production which provides high quality foods for much of the year.

Contraception: Inhibiting reproduction is one way of reducing some bird populations. However, in long-lived species like geese (Cramp and Simmons 1977) exclusive use of contraceptive methods may take a period of years to reduce local bird populations. Contraceptive methods are likely to be most valuable as a means of maintaining waterfowl populations at desired levels.

Canada Geese have been successfully vasectomized to prevent production of young; this method is only effective if the female does not form a bond with a different male. In a study conducted at the NYC Bronx Zoo, females failed to maintain pair bonds with vasectomized males and did lay fertilized eggs (N. Clum, Assistant Curator of Ornithology, Bronx Zoo, pers. comm., July 2009). In addition, vasectomies can only prevent the production of the mated pair. The ability to identify breeding pairs for isolation and to capture a male bird for vasectomy becomes increasingly difficult as the number of birds increase (Converse and Kennelly 1994). Keefe (1996) estimated mechanical sterilization of a Canada goose to cost over $100 per bird. Additionally, as is the case with most procedures involving anesthesia in wild animals, some birds will likely die from the procedure.

The USDA, APHIS, WS National Wildlife Research Center (NWRC) has been instrumental in the development and registration of a new product, nicarbazin (OvoControl-GTM; CAS 330-95-0/4,4-dinitrocarbanilide (DNC, CAS 587-90-6)/ 2-hydroxy-4,6-dimethylpyrimidine (HDP, CAS 108-79-2) (1:1)), which is an infertility agent for Canada geese and Rock Pigeons in urban areas. Nicarbazin is available to certified pesticide applicators and is not restricted to use by WS. Use of baits containing nicarbazin would allow the numbers of small to moderate sized groups of Canada geese and Rock Pigeons to be controlled by reducing the hatchability of eggs laid by treated birds without requiring the location of each individual nest to be determined (as is the case for egg oiling/addling/destruction). Currently it is not registered for use in the state of Ohio.

Nicarbazin is thought to induce infertility in birds by two main mechanisms. Nicarbazin may disrupt the membrane surrounding the egg yolk, resulting in intermixing of egg yolk and white (albumin) components, creating conditions in which the embryo cannot develop. Nicarbazin may also inhibit incorporation of cholesterol into the yolk, a step that is necessary for yolk formation, thereby limiting energy for the developing embryo. If the yolk does not provide enough energy, the embryo will not

completely form and the egg will never hatch. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Nicarbazin is undetectable in the plasma of Canada Geese, Mallards, and chickens by 4-6 days after consumption of nicarbazin bait has stopped. The levels of active ingredient in the blood are reduced by half within one day after bait consumption stops. If the level of active ingredient falls by approximately one half its peak levels, no effects on egg formation can be seen. By two days after bait consumption has stopped, no effects on the egg being formed are seen. Consequently, the bait must be offered to the birds each day of the nesting period for best impact on reproduction.

In a field study conducted in Oregon (Yoder et al. 2005), use of nicarbazin reduced hatchability of eggs 35.6% ($P = 0.062$). When considering the success of individual nests at sites rather than flocks as a whole, percent hatchability was significantly reduced 50.7% ($P < 0.001$). The high degree of variability among Canada Geese in their movement patterns, nesting and habitat use complicates use of this product (Vercauteren and Marks 2004). The variability in goose behavior can make it difficult to get the required doses to the geese. Under current label guidelines, the cost for nicarbazin (Ovocontrol®) applications exceeds the cost of other control methods (Cooper and Keefe 1997) until the goose population reaches a critical threshold of approximately > 80 birds (Caudell and Shwiff 2006). Research conducted on captive pairs of Rock Pigeons use of nicarbazin resulted in 59% reduction in the number of eggs hatched (Avery et al. 2007, unpub. report).

Nicarbazin can be expensive to use. For example, the label for pigeons recommends approximately 1 lb. of bait per day for approximately 80 pigeons and 5 lbs. of bait per day for 400 pigeons. At this rate, and an estimated cost of $6.80 per pound, the bait to treat a group of pigeons during a 6 month (180 day) breeding period would cost approximately $1,224 for an 80-bird flock and $6,120 for a 400 bird flock (Innolytics 2009). This cost estimate does not include staff time required to appropriately apply the bait. Pigeons must be conditioned to the baiting program for a period of roughly 5-14 days. The site must be visually observed daily during the conditioning period to ensure that non-target species are not feeding on the bait and to accurately determine the amount of bait to be used. All bait should be consumed within one hour of application. Unconsumed bait must be collected at the end of the feeding period. During observation periods, applicator must remain on-site until all bait is consumed or removed from the site. After the conditioning period, the flock must be visually observed weekly to ensure that adequate amounts of bait are being provided, that all bait is being consumed and that non-target species have not started using the site. The product may not be applied if non-target species are observed eating the bait.

Nest destruction: This method involves the removal of nesting materials during the construction phase of the nesting cycle. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners, or where the presence of birds is a safety risk at or near airports. This method can be used with single nests for species such as hawks, or for colony nesting birds such as gulls. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations.

Animal Behavior Modification: This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may include scare tactics or exclusion to deter or repel birds that cause loss or damage (Twedt and Glahn 1982). Some but not all devices used to accomplish this are:

- Exclusion (fencing and other barriers)

- Harassment including auditory scaring devices (*i.e.*, electronic guards, propane exploders, pyrotechnics, distress calls and sound producing devices), visual repellents/scare devices (lasers, scarecrows, falconry), and physical harassment (remote control devices, dogs)
- Chemical repellents (*i.e.*, mesurol, anthraquinone)

Exclusion

Exclusion involves physically blocking bird access to a site. Like habitat management, physical exclusion can provide a long-term nonlethal solution for deterring bird use of a structure or a site. Because of the cost involved in materials, construction and maintenance and the physical limitations of the systems, these methods are generally only practical for small areas and a limited number of species. Exclusion adequate to stop bird movements can also restrict movements of people, equipment and other wildlife (Fuller-Perrine and Tobin 1993). Some physical exclusion devices may be an impediment to the intended use of a site and some landowners, managers and users may consider the aesthetic impacts of physical exclusion devices to be unacceptable. Physical exclusion methods may be prohibitively expensive for some locations. Physical exclusion methods which may be useful at off-airport sites include:

Bird Barriers - Bird proof exclusions can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which require overhead barriers as well as conventional perimeter netting. Buildings and other areas could be "bird proofed" using hardware cloth or netting. Heavy plastic strips hung vertically in open doorways have been successful in some situations in excluding birds (Johnson and Glahn 1994).

Perching Deterrents - Perching deterrents are available in a wide variety of designs (Internet Center for Wildlife Damage Management 2009). Porcupine wire (e.g., Nixalite™, Catclaw™) and coil wire are mechanical repellent methods that can be used to exclude pigeons and other birds from ledges and other roosting surfaces (Williams and Coorigan 1994, Avery and Genchi 2004). The sharp points inflict temporary discomfort on the birds as they try to land, which deters them from roosting. Drawbacks of this method are that some pigeons have been known to build nests on top of porcupine wires and the method can be expensive to implement if large areas are involved. Electric shock bird control systems are available from commercial sources and, although expensive, can be effective in deterring pigeons and other birds from roosting on ledges, window sills and other similar portions of structures (Williams and Corrigan 1994).

Surface Coverings - Some bird species may be excluded from ponds, fields or other areas using overhead wire grids (Pochop et al. 1990, Fairaizl 1992, Lowney 1993). These lines should be made visible to the birds by hanging streamers or other objects at intervals along the wires. The objective is to discourage bird feeding activities and not cause bird injury or death. Overhead wire networks generally require little maintenance other than maintaining proper wire tension and replacing broken wires, and the spacing varies with the species being excluded. They have also been demonstrated to be most applicable on areas less than two acres, but may be considered unsightly or aesthetically unappealing to some people. Wire grids can render a pond unusable for boating, swimming, fishing, and other recreational activities. Installation costs are about $1,000 per surface acre for materials. The expense of maintaining wire grids may be burdensome for some people. Floating mats and balls approximately five inches in diameter can be used to cover the surface of a pond. Floating mats and "ball blankets" renders a pond unusable for boating, swimming, fishing, and other recreational activities.

Harassment

Harassment and frightening devices are those methods used to frighten birds away from an attractive resource. Harassment may be used in areas where physical exclusion and habitat management are not acceptable or feasible because of intended use of the site, perceived adverse aesthetic impacts of the habitat modification or exclusion device, or other site characteristics. Harassment may also be used as a short-term management alternative until more permanent methods (e.g., elimination of perching or nesting sites) can be implemented (Seamans and Helon 2006). Hazing with pyrotechnics, dogs, and lasers has become a popular means of repelling Canada Geese from urban and suburban sites such as parks, golf courses and cemeteries where there are problems with damage to vegetation and fecal contamination (Castelli and Sleggs 2000, Swift 2000, York et al. 2000, Holvinski et al. 2007, Preusser et al. 2008).

One of the primary limitations to the use of harassment programs is that birds often become accustomed to (habituated to) the frightening stimuli and may cease to respond to the stimulus(Bomford and O'Brien 1990). Birds may also learn to associate the stimulus with a particular person and vehicle and only attempt to use the site when the person/vehicle has left the site. Alternating and/or mixing frightening devices can help to reduce problems with habituation. Changing the location and the pattern (e.g., frequency of light and sound emission) of the frightening stimulus can also help problems with habituation. There are fewer problems with physical harassment (e.g., harassment by a person, animal or remote-controlled device) than other forms of harassment because of the actual threat of contact, injury or capture by the source of the harassment).

Harassment systems do not eliminate the original attractant so birds are likely to try to return to the site and new birds may be attracted to the area unless some form of exclusion or habitat modification can be implemented (Holevinski et al. 2007, Preusser et al. 2008). Holevinski et al. (2007) found that geese hazed from an area using pyrotechnics returned to the area within 1-25 minutes. Using multiple techniques instead of only pyrotechnics will increase the chances of successful harassment (Holevinski et al. 2007). In the study of an integrated harassment and egg-oiling program in Orange County, NY, geese did not move far from the areas in which they were being hazed (Preusser et al. 2008). Twelve of the 59 geese banded at one of the parks were observed at an unmanaged location 0.7 miles away on 161 occasions during the same year. While the number of geese utilizing the managed locations dropped, there was a corresponding rise in geese at unmanaged areas within 1.8 miles of the managed locations.

Acoustic Frightening Devices – This class of harassment methods may include propane exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations. Acoustic frightening devices are often not practical in suburban, urban or rural areas if they disturb people or pets. Pyrotechnics used as scare devices may be a temporary solution until geese become accustomed to the noise (Heinrich and Craven1990). In addition, under large feedlot situations they may not be appropriate because of the disturbance to livestock, although livestock would eventually habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics (Bomford and O'Brien 1990).

Scarecrows - The use of scarecrows has had mixed results. These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them

(Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972, Bomford and O'Brien 1990). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988). In general, scarecrows are most effective when they are moved frequently, alternated with other methods, and are well maintained.

Dogs - Dogs can be effective at harassing birds and keeping them off turf and beaches (Conover and Chasko 1985, Woodruff and Green 1995). Around water, this technique appears most effective when the body of water to be patrolled is ≤ 2 acres in size (Swift 1998). In New York, use of dogs was particularly effective when combined with remote controlled boats to harass geese that had moved into the water to avoid the dogs (Pecor et al. 2007). Although dogs can be effective in keeping birds off individual properties, they do not contribute to a solution for the larger problem of overabundant/anthropogenic abundant bird populations (Castelli and Sleggs 1998). Swift (1998) and numerous individuals in New York have reported that when harassment with dogs ceases, the number of birds usually return to pre-treatment numbers. WS has recommended and encouraged the use of dogs where appropriate.

Falconry - Falconry is the practice of using falcons and hawks to chasing/hunt other wildlife species and return to the handler. It is regulated under both Federal and State laws and all raptors in the United States are protected under various statutes; any "take" of a raptor must be done under the appropriate permit to be legal. The care and housing of falcons can be expensive (Chamorro and Clavero 1994) and there are drawbacks to using falcons to disperse birds from damage or potential damage sites (Hahn 1996) (*i.e.,* falcons are generally only flown when weather and lighting condition permit).

Laser - Lasers are a relative new technique used to frighten and disperse birds from their roosts or loafing areas. Although the use of a laser (the term of "laser" is an acronym for Light Amplification by Simulated Emission of Radiation) to alter bird behavior was first introduced nearly 30 years ago (Lustick 1973), it received very little attention until recently when it was tested by the NWRC. Results have shown that several bird species, such as Double-crested Cormorants, Canada Geese, other waterfowl, Gulls, Vultures (*Cathartes aura* and *Coragyps atratus*), and American Crows have all exhibited avoidance of laser beams during field trails (Glahn et al. 2001, Blackwell et al. 2002). The repellent or dispersal effect of a laser is due to the intense and coherent mono-wavelength light that, when targeted at birds, can have substantial effects on behavior and my illicit changes in physiological processes (APHIS 2001). Best results are achieved under low-light conditions (*i.e.*, sunset through dawn) and targeting structures or tree proximate to roosting birds, thereby reflecting the beam. In field situations, habituation to lasers has not been observed (APHIS 2001).

The avian eye generally filters most damaging radiation (*e.g.*, short-wavelength radiation from the sun). In tests conducted with Double-crested Cormorants exposed to a relatively low-power Class-III B laser at a distance of 1 meter, no ocular damage was noted (APHIS 2001). However, unlike birds, the human eye, with the exception of the blink reflex, is essentially unprotected from thermal damage to retinal tissue associated with concentrated laser radiation. Lasers used by WS include the Class-III B, 5-mW, He-Ne, 633-nm Desman laser, and the Class II, battery-powered, 68-mW, 650-nm, diode Laser Dissuader. Because of the risk of eye damage, safety guidelines and specifications have been developed and are strictly followed by the user (Occupational Safety and Health Administration 1991, Glahn and Blackwell 2000).

Spotlights - The use of light to disturb or move loafing and or roosting birds can be an effective technique if the harassment is maintained over a long period of time (VerCauteren et al. 2003). This method is similar to the laser, but has a much reduced price. The sacrifice in reduced pricing also limits the range and effectiveness of this method when compared to the laser.

Remote Control Devices - The use of remote control devices for the purpose of disturbing the activity or behavior of birds is a relatively new concept. These devices have been in existence for many years, but their durability, range, strength and cost have improved dramatically. Remote control devices are available in numerous forms such as: speed boats, helicopters, airplanes, sail boats, race cars, etc. Holevinski et al. (2007) reported that in trials with the use of remote control boats and border collies they were able to remove >90% of geese 97% of the time; however the geese returned within 30 minutes.

Chemical Repellents

Bird repellents may be used to reduce bird feeding on plants, repel birds from temporary pools of standing water, and have been used as a tactile repellent to prevent perching on building ledges and similar locations. Products available for use include but are not limited to:

Methyl Anthranilate (MA) - MA is artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. MA is currently registered as a repellent to protect turf from bird grazing and as a spray for airport runways to reduce bird activity/risk on or near airports. It is also been investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or the FDA.

Mesurol - This chemical repellent is used for non-lethal taste aversion. It is registered by the EPA for aversive conditioning egg treatment to reduce predation from common ravens, white-necked ravens (*C. cryptoleucas*), and American crows on the eggs of protected, T/E species, or eggs of other species designated to be in need of special protection (EPA Reg. No. 56228-33). Mesurol is registered for WS use only. The active ingredient is methiocarb which is a carbamate pesticide which acts as a cholinesterase inhibitor. Species which feed upon treated eggs may show signs of toxicity (*e.g.* regurgitation, lethargy, temporary immobilization). Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Avery et al. (1995) examined the potential of using eggs injected with 30mg of mesurol to condition ravens from preying on eggs of endangered California least terns (*Sterna antillarum*). The result concluded that proper deployment of treated eggs can be a useful, nonlethal method of reducing raven predation at least tern colonies. Avery and Decker (1994) evaluated whether predation might be reduced through food avoidance learning. They used captive fish crows (*Corvus caurinus*) to examine avoidance response from mesurol (18mg/egg) and MA (100mg/egg). Their conclusion showed that some crows displayed persistence to the 5-day exposure and that successful application may require extended period of training for target predators to acquire an avoidance response. During the spring of 2001, WS conducted a field test on the Sterling Wildlife Management Area in Bingham County, Idaho, where mesurol treated eggs were exposed to black-billed magpies (*Pica pica*) to evaluate aversive conditioning to eggs of waterfowl and upland game birds. Magpies feeding on treated eggs decreased after a short period of time, however, their feeding behavior switched to pecking holes in eggs, possibly

trying to detect treated eggs before consuming them. This behavior may suggest that at least some birds experienced the ill effects of mesurol, but the *"tasting"* of eggs may result in increased predation (Maycock and Graves 2001).

Anthraquinone (Flight Control™) - Anthraquinone is a non-lethal repellent currently registered in the United States for use on geese. 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). Additional bird-repellent applications are being developed for rice and corn seed treatments and aerial application to ripening rice (Avery 2003). 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). Anthraquinone is a secondary repellent and affects birds by causing post-intestinal distress. Sometimes ingestion of anthraquinone-treated food produces vomiting, but often vomiting does not occur and the bird just sits quietly until the discomfort passes. Anthraquinone is not a taste repellent or contact irritant as the birds do not hesitate to eat treated food, and they exhibit no sign that treated food is unpalatable to them. However, once the birds experience the adverse consequences they learn to avoid the protected food.

Anthraquinone is a stable compound and virtually insoluble in water and there are no known hazards to non-target species from repellent application of anthraquinone. It is not phytotoxic and does not inhibit germination of rice seeds or growth of sprouts. It also has a very low toxicity to birds and mammals, and it appears to be innocuous to insects (Avery 2003). Anthraquinone is not registered for use in Ohio.

Tactile repellents - A number of tactile repellent products are on the market, which reportedly deters birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason et al. 1989). The repellency of tactile products is generally short-lived because of dust, and they sometimes cause aesthetic problems and expensive clean-up costs by running down the sides of buildings in hot weather. Tactile repellents are unsuitable for use with waterfowl and are unlikely to be useful on the scale needed to address off-airport problems with flocks of feeding and roosting blackbirds, crows, Rock Pigeons, or House Sparrows. Consequently, this method is not being advanced for further analysis.

Other Chemical Repellents - A number of other chemicals have shown bird repellent capabilities and new nonlethal repellents may become available in the future. Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting Starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling starlings (Dolbeer et al. 1998). In the event that new repellents become available, WS will evaluate the products to determine if they have potential environmental impacts which have not been addressed in the EA and supplement the analysis as appropriate in accordance with the NEPA.

Live Capture Methods can be used the WS program for disease surveillance, research, and damage management. Live-captured birds may be released on site (e.g., disease surveillance, research), relocated, or euthanized depending upon the species and circumstances of the project (see Relocation and Lethal Methods sections below). Non-target species may be captured in some of these devices, but in most cases it is possible to release non-target species unharmed.

Clover, Funnel, and Common Pigeon Traps
These traps are enclosure traps made of nylon netting or hardware cloth and come in many different sizes and designs, depending on the species of birds being captured. The entrances of the traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps are baited with grains or other food material, which attract the target birds. WS' standard procedure when conducting trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds.

Cage Traps
This category of traps represents a wide variety of traps including decoy traps and Swedish goshawk traps. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Swedish goshawk trap construction and use is described in Meng (1971). These traps are used to capture raptor species such as Red-tailed Hawks. They are most often used at airports to remove raptors that pose bird strike risks to aircraft, but can be used to remove individuals that are depredating on captive waterfowl or chickens. Birds caught in Swedish goshawk traps are most often relocated, but in some cases they are euthanized.

Nest Traps
Nest traps are used by WS to capture birds on a nest. Nest box traps are used to capture cavity nesters such as European starlings to prevent breeding activity by this non-native species. They can also be used to catch native birds such as American kestrels in sensitive areas such as airfields. Nest traps similar to funnel traps have been placed over the nests of ground nesting birds such as gulls to capture the adults.

Mist Nets
Mist nets are most commonly used for capturing small-sized birds such as house sparrows, finches, etc. but can be used to capture larger birds such as ducks and ring-neck pheasants (*Phasianus colchicus*). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net. Dho gazzas are net systems similar to mist nets. They are designed capture raptors.

Cast Nets, Landing Nets, and Hand Nets
These types of capture methods employ nets that are thrown or dropped over a target species. Hand nets are used to capture injured birds, or birds restrained in another larger type of trap (e.g., corral trap, or large cage traps. They are also used inside buildings to capture birds and remove them from public areas.

Powered Nets
Powered nets include bow nets and similar devices. They usually include a net attached to a round or square hinged, spring-loaded frame. One side of the frame is folded back and secured by a device attached to a trigger. When the trigger is released the frame springs back into place pulling the net over the bird. These devices can be trigged by a pan with bait attached to it or by remote control.

Propelled Nets
This category of capture devices includes cannon nets, rocket nets, Coda net guns (shoulder and ground mounted), and the Super Talon net gun. The cannon and rocket nets, and the Coda ground mounted system are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds, which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds which are typically shy to other types of capture. The net guns are usually used to capture species like gulls, waterfowl, and raptors. The Coda net guns use a blank .308 rifle cartridge for propulsion and the Super Talon uses compressed air cartridges for propulsion. The net is propelled from the shoulder-mounted or hand held device over the target.

Pole traps
Pole traps are generally set for raptors which perch on poles prior to making an attack. Problem hawks and owls can be safely trapped using a well-padded (*i.e.*, with foam rubber wrapped in electricians tape, surgical tubing) steel leg-hold trap (No. 1½ or other appropriate size), snare or tangle snares set on the top of poles. Poles that are 5 to 10-foot high near the threatened area where they can be seen easily and place one padded trap on top of each pole. The wire is run through the trap ring and the wire is secured to the pole and ground so that trapped birds may slide to the ground where the bird can rest. 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.

Bal-chatri Traps and Noose Mats
These traps are used for capturing birds of prey such as hawks and eagles. Live bait such as pigeons, starlings, rodents, etc. is used to lure raptors into landing on the trap (Hygnstrom and Craven 1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material and formed into a Quonset hut shape cage which holds the live bait. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string. Noose mats use a series of small nooses on a mat similar to nooses used on Bal-chatri traps and are used to live-capture shorebirds (Mehl et al. 2003).

Alpha chloralose (AC)
AC is a chloral derivative of glucose and a central nervous system depressant (*i.e.*, depresses cortical centers in the brain) used as an immobilizing agent to capture and remove waterfowl and other birds causing a nuisance, and for capture of birds for research purposes[1]. It is labor intensive and in some cases, may not be cost effective depending on the application and purpose (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts and for the capture of birds for research. Alpha chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans and the target birds. Single bread or corn baits are fed directly to the target birds. Wildlife Services personnel or other authorized personnel are present at the site of application during baiting to

1 With proper use and follow-up, AC reduces the potential for stress, injury and death in many situations over other capture techniques.

retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Wildlife Services is currently authorized by FDA to use AC to capture waterfowl, coots, pigeons and ravens under Investigative New Animal Drug (INAD) 6602 under a category of nuisance animals.

Alpha chloralose was eliminated from more detailed analysis in USDA (1997 Revised) based on critical element screening; therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. AC is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about 2 to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Wornecki et al. 1990) but the compound is not generally soluble in water and therefore should remain unavailable to aquatic organisms. Because of the method of delivery, water contamination is highly unlikely.

Relocation: Relocation has been used with some success for low abundance species such as raptors (Schafer et al. 2002). Harassment techniques (e.g., pyrotechnics) generally are not effective in dispersing raptors from airports and killing raptors on airports to reduce strikes is generally not a recommended action because of their protected status and beneficial attributes (except when on airports). Relocation has also been attempted for more abundant species such as waterfowl (Cooper 1991, York et al. 2001). In some of the waterfowl relocation programs, the project goals have included releasing the birds in sites where they are available for hunter harvest. In these programs, the increased mortality in relocated birds, including hunter harvest, likely plays an important role in the general efficacy of this method (Smith 1996, Cooper and Keefe 1997).

Smith (1996) reported that groups of juvenile geese relocated from urban to rural settings can effectively eliminate these geese from urban areas, retain them at the release site, include them in the sport harvest, and expose them to higher mortality. Smith (1996) also reported that multiple survival models indicated that survival estimates of relocated juveniles were half of those of urban captured and released birds. Hall and Groninger (2002) reported mortality rates of 19% for translocated geese in New Mexico (17.6% attributed to hunting). Mortality rates for geese captured and released on site instead of relocated were 14.2% (9.8% attributed to hunting). Woytek and Hestbeck (1997) reported that relocated goslings had higher recovery rates, lower survival and high fidelity to relocation areas in Minnesota than normal wild goslings. Ultimately, the relocation of resident waterfowl from metropolitan communities can assist in the reduction of overabundant populations (Cooper and Keefe 1997), and has been accepted by the general public as a method of reducing waterfowl populations to socially acceptable levels (Fairaizl 1992).

States like Minnesota and Michigan have used or are using programs which round-up urban waterfowl and give them to farms where the birds spend the rest of their lives. These programs have proven to be expensive for the state and have encountered difficulties with the sites which accept birds running out of room for new birds. Although individuals opposed to the use of lethal techniques may prefer this alternative, there are some people who feel that committing a wild bird to life in captivity is also inappropriate.

Despite some successes with Canada Geese and raptors, relocation programs face numerous challenges. The method may not be cost effective for abundant species. Many problem bird species

are highly mobile and can easily return to damage sites from long distances. Habitats in other areas may already be occupied, and relocation may result in bird damage problems at the new location. Additionally, few areas are likely to accept non-native species such as Rock Pigeons, House Sparrows, Mute Swans, domestic ducks and European Starlings. Relocation of resident birds, especially resident waterfowl has the potential to spread disease into populations of other resident birds and/or migrating waterfowl. The American Association of Wildlife Veterinarians, "...discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control." (AAWV undated). Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of concerns pertaining to disease transmission, stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats, and the ability of some species to return to their original site.

LETHAL METHODS

Egg Addling/Oiling /Destruction: These techniques involve destroying the embryo prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen. The advantage of egg addling and egg oiling is that adult birds may continue to incubate the eggs even though they are not viable. This delay helps reduce the likelihood that the adults will re-nest.

Shooting with shotguns, air rifles, or rim and center-fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. All firearm safety precautions are followed by WS when conducting bird damage management activities, and laws and regulations governing the lawful use of firearms are strictly complied with. Shooting is a very individual specific method and is normally used to remove a single offending bird, or group of birds numbering less than 50 at one location. Shooting is more effective as a dispersal technique than as a way to reduce bird densities when a large number of birds are present. Shooting a few birds could be shot from a flock may be used to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997 Revised). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Non-toxic shot will be used to harass or take migratory birds at all times; however lead shot may be used to harass or take non-migratory bird species in non-wetland/riparian areas.

Firearm use is very sensitive issue and a public concern because of concerns relating to the misuse of firearms. To ensure safe firearms use and safety awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

DRC-1339: DRC-1339, 3-chloro-4-methylbenenamine hydrochloride, is an avian toxicant registered with the Environmental Protection Agency (EPA) and by the Ohio State Department of Agriculture. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull,

crow, raven, magpie, and pigeon damage management (West et al. 1967, Besser et al. 1967, and Decino et al. 1966). It is a slow acting avicide that is rapidly metabolized and excreted after ingestion. Because of its rapid metabolism, DRC-1339 poses a discountable risk of secondary poisoning to non-target animals, including avian scavengers (Cunningham et al. 1979, Schafer 1984, Knittle et al. 1990). This compound is also unique because of its relatively high toxicity to most pest birds but low-to-moderate toxicity to most raptors and almost no toxicity to mammals (DeCino et al. 1966, Schafer 1991). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/ bird to cause death (Royall et al. 1967); many other bird species such as raptors, sparrows, and eagles are classified as non-sensitive (USDA 1997 revised Pages P194-P210). Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and Threatened or Endangered (T/E) species (USDA 1997 revised Pages P194-P210). Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on birds killed by DRC-1339 and its tendency to be completely metabolized in the target birds which leaves little residue to be ingested by scavengers.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, ultra violet radiation or water and is highly soluble in water but does not hydrolyze. DRC-1339 tightly binds to soil and has low mobility. The half-life is approximately 25 hours, which means it is nearly 100% broken down within a week. Identified metabolites (*i.e.*, degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997 revised Pages P194-P210). The EPA label prohibits using DRC-1339 baits directly in water or areas where runoff is likely.

Prior to the application of DRC-1339, pre-baiting is required to monitor for non-target species that may potentially consume treated baits, reducing potential exposure to non-target species. If non-target species are observed feeding on pre-bait, OH WS would postpone use of DRC-1339, terminate the proposed project until non-targets discontinue feeding at the site, change bait types to reduce its attractiveness to non-targets or select an alternative site. EPA labels for DRC-1339 prohibit use of the product in areas where potential consumption of treated baits by T/E species could occur. DRC-1339 is typically used on both public and private lands in urban and rural areas for lethal control of starlings, blackbirds, pigeons, magpies, ravens and crows.

Avitrol is an avicide used as a damage management tool for house sparrows, blackbirds (red-winged, yellow-headed, and Brewer's blackbirds, grackles, cowbirds, European starlings), rock pigeons and crows. Avitrol® is a restricted-use pesticide that can only be sold to certified applicators, and is available in several bait formulations. Treated bait is mixed with untreated material to form a final bait formulation where only a small portion of the individual grains carry the chemical. For most species, dilution rates lower than a 1 to 9 ratio are not recommended or needed. For example, one of the formulations for use in pigeons notes that dilution rates of 1 to 29 can be effective in most situations (EPA Reg. No. 11649-7). For house sparrows, lower dilution rates such as 1 to 5 may be needed for particularly difficult problems (EPA Reg. No. 11649-6). The active ingredient (4-aminopyridine) acts on the central nervous systems and motor nervous systems. Birds display abnormal flying behavior after ingesting treated baits, become disoriented and emit distress vocalization (Roswell et al. 1979, EPA 2007). There is variation among species in response to the product (e.g., pigeons generally do not vocalize) and in response to treated birds. Some species such as blackbirds appear to be highly responsive but others such as house sparrow and rock pigeons are less responsive (EPA 2007). In a study by Roswell et al. (1979), treated birds displayed depressive and dissociative anesthetic electro-encphalographic changes during course of action. These changes

would appear to indicate that although the treated birds are behaving abnormally, they are not in pain. Behavior by treated birds usually deters the remaining birds from the site (EPA 2007). Birds that consume treated baits normally die.

An EPA Ecological Risks Assessment for avitrol (EPA 2007) identified the following potential ecological risks from avitrol use: risk of environmental contamination and local impacts on plants from avitrol which may be washed of bait during rain events, risks to animals which may drink water which has accumulated in avitrol bait stations during rainfall events, risks of direct consumption of avitrol by non-target species, and secondary hazards to predators which may consume animals which have eaten avitrol. The EPA evaluation was conducted using application as directed by the label and does not take into account additional precautions used by Idaho WS to reduce potential risks from the use of this product. Risks associated with use of avitrol broadcast on the ground and avitrol exposure to rainfall are eliminated because WS uses bait stations to administer avitrol. Wildlife Services personnel remain on site during avitrol application and will not apply bait when it could be rained on unless the bait station is placed in a location where the bait will not be exposed to rainfall. Any bait left after a treatment will be disposed of in accordance with label directions. Current label requirements stipulate that the product must not be applied were non-target birds are feeding and that careful observations of the birds' feeding habits must be made to establish proper feeding locations and to determine that no non-target birds are feeding on pre-bait. In addition to pre-baiting, WS' use of bait stations and harassment of non-target species which may approach during bait application prevents risks of non-target species directly consuming treated bait. Consequently potential risks of primary toxicity, water contamination and plant exposure to avitrol from WS' use of this product are negligible.

There are three likely routes by which a predator or scavenger could be exposed to avitrol treated birds; through consumption of birds behaving erratically because they have consumed a toxic dose of avitrol, consumption of carcasses of birds killed with avitrol, and consumption of birds which had consumed a sub-lethal dose of avitrol. The EPA report discusses potential secondary hazards to predatory animals and references Ecological Incident Information System (EIIS) records of four predatory bird deaths, including one Peregrine Falcon (*Falco peregrinus*), that were determined to be due to ingestion of poisoned birds (EPA 2007). In other states, WS has also received comments regarding a hypothesis that exposure to sub-lethal doses of avitrol may cause disorientation and contribute to building collision deaths of raptors in urban areas. In a study by Schafer et al. 1974, no effects were observed in predatory and scavenging species fed avitrol-treated blackbirds, but no information was available on the amount of avitrol in the blackbirds. The dose required to kill a blackbird is lower than for more resistant bird species such as pigeons. The EPA report noted that it would be possible for birds in the wild to consume more avitrol than the birds were fed in the laboratory studies. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning. However, in a field study, magpies and crows may have been affected secondarily (Schafer 1991). A laboratory study showed, though, that magpies which fed on birds killed with two to 3.2 times the lethal dose of active ingredient for 20 days were not affected (Schafer et al. 1974). As noted above, the EPA report considered risks from avitrol in light of label requirements not Idaho WS procedures to reduce risks. Risk of raptors catching and consuming birds behaving erratically because of avitrol poisoning is minimized by the presence of WS personnel at the treatment site who can harass any non-target birds, including raptors, which may approach the treatment area. WS patrols the area around the treatment site and collects and properly disposes of carcasses of birds killed with avitrol. Data from Schafer et al. (1984) indicate that avitrol is non-accumulative in tissues and rapidly metabolized by many species. Chronic toxicity has not been demonstrated (Schafer 1991). It is difficult to know the circumstances surrounding the mortality of

the raptor species noted in the EIS. However it should be noted that most avitrol use is by private contractors who, while they may comply with label directions, may not employ the extra protective measures used by WS. Although mortality of individual non-target birds has occurred and is regrettable, to date, there has been no evidence of major non-target kills or adverse impacts on non-target species populations.

Avitrol® is water soluble and EPA expects the product to be both mobile and persistent in the open environment (EPA 2007). However, use of bait stations, the fact that WS will not use the product when it is raining, and adherence to label requirements for collections and proper disposal of unconsumed bait should prevent environmental contamination. Laboratory studies demonstrated that Avitrol® is strongly absorbed onto soil colloids and has moderately low mobility (USDA 1997 revised P184-185). Avitrol is expected to be stable under anaerobic conditions. Aerobic biodegradation is expected to be slow in soil and water, with a half-life ranging from 3 to 32 months (EPA 2007).

Snap Traps: Wooden based rat snap traps can be effective in killing offending birds, usually woodpeckers. The trap is nailed to the building with the trigger pointed downward alongside the area of the building sustaining the damage. The trap is baited with nut meats (walnuts, almonds, or pecans) or suet. If multiple areas are being damaged several traps can be used.

Carbon Dioxide (CO_2) Gas is a colorless, odorless, noncombustible gas approved by the AVMA as a euthanasia method (Beaver et al. 2001). CO_2 is a common euthanasia agent apparently because of its ease of use, safety, and ability to euthanize many animals in a short time span. The advantages for using CO_2 are: 1) the rapid depressant, analgesic, and anesthetic effects of CO_2 are well established, 2) CO_2 is readily available and can be purchased in compressed gas cylinders, 3) CO_2 is inexpensive, nonflammable, non-explosive, and poses minimal hazard to personnel when used with properly designed equipment, and 4) CO_2 does not result in accumulation of tissue residues. Carbon dioxide has been used to euthanatize mice, rats, guinea pigs, chickens, and rabbits, and to render swine unconscious before humane slaughter. Studies of 1-day-old chickens have revealed that CO_2 is an effective euthanatizing agent. Inhalation of CO_2 caused little distress to the birds, suppresses nervous activity, and induced death within 5 minutes. In addition, inhalation of CO_2 at a concentration of 7.5% increases the pain threshold, and higher concentrations of CO_2 have a rapid anesthetic effect.

Wildlife Services sometimes uses CO_2 to euthanize birds which have been captured in live traps, by hand, or by chemical immobilization and when relocation is not feasible. Live birds are placed in a container or chamber and CO_2 gas from a cylinder is released into the chamber. The birds quickly expire after inhaling the gas.

Cervical Dislocation is a method used to euthanize birds after they have been captured by other means. The bird is grasped by the legs and the neck is stretched by pulling on the head while applying a ventro-dorsal rotational force to the skull (AVMA 2013). The American Veterinary Medical Association considers this technique appropriate for birds under 3 kg.

Hunting

Wildlife Services sometimes recommends that resource owners consider legal hunting as an option for reducing game bird species damage. Although legal hunting is impractical and/or prohibited in many urban/suburban areas, it can be used to reduce some local populations of game birds. Legal hunting also reinforces harassment programs (Kadlec 1968).

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

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February 25, 2014

Mr. Andrew Montoney
Wildlife Services
6929 Americana Parkway
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TAILS: 03E15000-2013-I-0774

Dear Mr. Montoney:

This is in response to your November 21, 2013 letter providing additional information and determinations for federally listed species within Ohio from the proposed bird damage management program. The activities would be conducted on private and public lands in the State of Ohio when the owner or manager requests assistance. Methods of control including nonlethal methods such as physical exclusion, habitat modification, or harassment would be recommended and utilized to reduce damage. Lethal methods of control include shooting, trapping and using registered pesticides. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce bird damage to human health and safety, property, agriculture, and natural resources.

Critical habitat for the piping plover exists in Sheldon Marsh State Nature Preserve, Huron, Erie County, and at Headlands Dunes State Nature Preserve, Lake County, Ohio. The Ottawa National Wildlife Refuge is located in northwest Ohio along Lake Erie and provides important stopover habitat for migratory birds. The Ohio River Islands National Wildlife Refuge consists of twenty-two islands and three mainland tracts scattered along nearly 400 miles of the Ohio River, with most of the land located in West Virginia.

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) provides technical assistance and direct operational damage management to property owners and managers who request it. You have indicated that an IWDM strategy would be recommended and used to minimize the harmful effects on humans, target and non–target species, and the environment. The information provided indicated that WS will follow recommendations provided by the Region 3 office of U.S. Fish and Wildlife Service (Service) and the Ohio Department of Natural Resources (ODNR), Division of Wildlife.

In 2012 USDA APHIS and the Service signed a Memorandum of Understanding (MOU). This MOU focuses on avoiding or minimizing adverse impacts on migratory birds. The

proposed bird damage management program should be consistent with the MOU and should avoid impacts to birds of conservation concern.

Methods of non-lethal management:
Non-lethal management may include the use of resource management, animal behavior modification, live capture methods, or relocation. All of these methods will be used in manner that minimizes impacts to non-target species.

The Service supports resource management efforts such as altered aircraft flight patterns, cultural methods, human behavior management, and lure crops/alternate foods. Environmental/habitat modification that involves removal of vegetation may affect non-target species including federally listed species and migratory birds. In some circumstances impacts can be reduced through seasonal timing of vegetation impacts and avoidance of high quality habitat. **You have indicated that the removal of scrub/shrub habitat within 3 miles of Lake Erie will be coordinated with this office prior to implementation**. In addition, forest habitat suitable for the Indiana bat will not be removed during the summer roosting season. USDA APHIS will coordinate with this office on the removal of potential maternity roost trees and on actions that could result in isolation of a potential maternity roost tree.

Contraception and nest destruction can reduce some birds' future populations. Nicarbazin has been registered for use as an infertility agent for Canada geese and rock pigeons in urban areas. However, it is not registered for use in Ohio and therefore will not be discussed further in this letter. Nest destruction and mechanical sterilization only affect target species and impacts to non-target species are minimized.

Animal behavior modification includes exclusion, harassment, and chemical repellants. The Service supports the use of physical exclusion to limit access of birds to a site, such as fencing and other barriers. We also support harassment of birds to keep them from congregating at airports, feedlots, and other sites that lead to human and avian conflicts. This includes the use of acoustic frightening devices, scarecrows, dogs, falconry, laser, spotlights, and remote control devices. Chemical repellants include the use of methyl anthranilate (MA), Mesurol, and anthraquinone.

MA is an artificial grape flavoring. It occurs naturally in concord grapes and other plant material. It repels birds by irritating receptors associated with taste and smell (Umeda 2001). MA has a low toxicity to mammals. High concentrations of MA dissolved in water can affect fish however; it has a low toxicity when it is consumed by fish (Clark 1993). There is very little information available on its toxicity to reptiles, amphibians, insects, or aquatic invertebrates.

Mesurol is toxic to fish, birds, mammals, honey bees, and aquatic organisms (Gowan 2007). One formulation is used as molluscicide on ornamental plants and could have impacts on freshwater mussel species. There is very little information available on its toxicity to reptiles, amphibians, or invertebrates other than honeybees. Mesurol will not be used in or near water. This will avoid possible impacts to amphibians, fish, mussels, and other aquatic organisms. It is registered for use by the Environmental Protection Agency (EPA) to be used by WS

personnel specifically for the conditioning of ravens and crows not to feed on eggs. It is not intended to be used in a manner that would cause death of the birds. Mesurol's mechanism of action is inhibition of the enzyme cholinesterase (Gowan 2007). As a restricted use pesticide it has limited applications and it will have limited use in Ohio. Anthraquinone is not registered for use in Ohio and will not be used; therefore it will not be discussed further in this letter.

Live capture methods include the use of traps, nets, and alpha chloralose (AC). The EA indicates that trapping procedures require an adequate supply of food and water to sustain captured birds for several days. **The Service recommends that procedures also insure that traps receive suitable shade to prevent trapped birds from experiencing heat stress during hot, sunny weather.** The use of nets may include the utilization of mist nets for the purpose of disease monitoring and surveillance activities. Traps and nets will be operated to avoid injury to birds. **Relocation should not be used for non-native species as this may lead to further ecological concerns**. If any relocation of native species is conducted, measures to avoid possible disease transmission should be considered.

AC is used to immobilize birds so that they can be captured. Mortality to targeted bird species may occur if they consume a high concentration of AC. AC has also been used to immobilize mammals (Coulson 2003). The U.S. Food and Drug Administration (FDA) has authorized WS to use AC on specific species of birds. Aquatic toxicology studies were not required due to the limited applications authorized; therefore there is limited information on the toxicity of this substance to reptiles, amphibians, fish, or invertebrates. The chemical cannot be used by private individuals and therefore it will not be used extensively in Ohio. WS personnel or other personnel will be present at the site of application during pre-baiting and baiting. If any non-target species are observed during pre-baiting, AC will not be applied at that location. If any non-target species are observed during baiting, steps will be taken to discourage them from the site and the bait will be removed. This will insure avoidance of impacts to non-target species. Due to the terrestrial application of bait treated with AC and the retrieval of all unconsumed bait, no impacts to aquatic resources are expected.

Methods of lethal management:

For any type of lethal management significant effort should be made to avoid impacts to non-target species. The 2012 MOU between APHIS and the Service indicates that nonlethal methods will be preferred when they are practical and effective. When these methods are not practical then lethal methods may be used. Lethal methods may include egg oiling/addling/destruction, shooting, DRC-1339, Avitrol, euthanasia, and hunting/depredation permits. Reductions in egg survival will not have an immediate effect on the population of the target species but it will avoid impacts to non-target species and the environment.

You have indicated that non-toxic shot will be used at all times and that lead shot would only be used for non-migratory bird species in non-wetland/riparian areas. **The Service encourages the use of non-lead shot in all locations to reduce the availability of lead in the environment. If this is not possible then all carcasses should be retrieved and disposed of properly to prevent non-target scavengers from ingesting lead shot.** We support hunting and trapping as a management tool when it is used appropriately since it

should limit impacts to non-target species. **A defined limit of take of birds should be established before this option is initiated.** Snap traps were indicated as a lethal method of control in alternative 1. These traps do not discriminate between target and non-target species. The only control in the use of snap traps is the selection of bait. In most of the other lethal methods listed, positive species identification is made before the lethal action is initiated. **The Service recommends that methods with lower non-target mortality be considered a higher priority than those that have a greater potential to impact non-target species, such as snap traps.**

According to the information you provided, the pesticides DRC-1339 and Avitrol are listed for possible use. Both products should be kept out of lakes, streams, and ponds. The Service recommends that use of any of these products must comply with the State and Federal requirements and manufacturer guidelines. You have indicated that these substances will be primarily used during the winter when neotropical migratory birds have already migrated south.

DRC-1339 has a high toxicity for some birds, a low to moderate toxicity to raptors, and low toxicity to mammals. In one study, of the owls tested, only the barn owl was sensitive to this compound (Eisemann 2001). There is very little information available on its toxicity to reptiles, amphibians, insects, aquatic invertebrates, or fish. It is only available for use by WS and therefore it will not be used extensively in Ohio. Ingestion of DRC-1339 results in increased level of uric acid in the blood (Eisemann 2001) which causes kidney damage. In species not sensitive to the chemical the central nervous system is depressed and this can be successfully treated (USDA 2001). When ingested by a bird the chemical is nearly completely metabolized. This reduces the threat of secondary poisoning to scavengers such as raptors including hawks and owls. In addition, it does not bioaccumulate (Eisemann 2001). The EA indicates that aquatic and invertebrate toxicity is low. The labeled use of this product requires prebaiting in which untreated food is placed in a location where the target species will find and consume it. If any non-target species are observed at the baiting station then that site cannot be used for application of DRC-1339.

Avitrol is a restricted-use pesticide that causes birds that ingest it to become hyperactive and release distress calls which cause the rest of the flock to be flushed from that location (Extoxnet 1996). Its mode of action is to inhibit potassium ion channels in nerve fibers (USEPA 2007). Birds that consume enough treated seed to become hyperactive, will most likely die. It is highly toxic to mammals (Extoxnet 1996). Avitrol is water soluble and is very toxic to fish (Briggs 1992). Due to its limited use, no data on the toxicity of this chemical on aquatic invertebrates is required by the EPA. The EA indicates that it will not be used when it is raining. Secondary poisoning could occur if predators consume birds that are behaving erratically due to ingestion of Avitrol, birds that have died from Avitrol poisoning, or birds that have ingested a sub-lethal dose of Avitrol. Due to the monitoring for non-target species, as well as the disposal of birds killed by Avitrol, and the disposal of unconsumed bait, secondary poisonings can be reduced.

Methods of euthanasia that may be implemented include administration of carbon dioxide gas and cervical dislocation. These methods are used on target species that cannot be relocated.

Depredation permits are issued by U.S. Fish and Wildlife Service (FWS) Regional Migratory Bird permit office. **According to the 2012 MOU between APHIS and the Service all requirements of these permits will be complied with and all necessary documentation will be completed, including the tracking of authorized migratory bird take.**

ENDANGERED SPECIES COMMENTS:
The proposed project area lies within the range of the **Scioto madtom** (*Noturus trautmani*), a federally listed endangered species. This species was known from a specific area and has not been seen since 1957. WS has indicated that the proposed program will have no effect on the Scioto madtom, therefore consultation is not required.

Freshwater Mussels
You have indicated that bird damage management activities are not expected to occur within the habitat of the **clubshell mussel** (*Pleurobema clava*), **fanshell mussel** (*Cyprogenia stegaria*), **northern riffleshell mussel** (*Epioblasma torulosa rangiana*), **pink mucket pearly mussel** (*Lampsilis abrupta*), **purple cat's paw pearly mussel** (*Epioblasma obliquata obliquata*), **rabbitsfoot** (*Quadrula c. cylindrical*), **rayed bean mussel** (*Villosa fabalis*), **sheepnose mussel** (*Plethobasus cyphyus*), **snuffbox** (*Epioblasma triquetra*), and **white cat's paw pearly mussel** (*Epioblasma obliquata perobliqua*).

Most of these mussel species are found exclusively in flowing streams. The rayed bean can be found in smaller, headwater creeks, but records exist in larger rivers. They can also be found in or near shoal or riffle areas, and in the shallow, wave-washed areas of lakes. All of the mussel species utilize stream or aquatic habitat. The proposed bird damage management activities would occur terrestrially and do not involve stream alteration or drainage. None of the methods indicated will affect the habitat of these species. Due to the project description and the limited use of these substances to terrestrial locations, effects to mussel species are avoided. WS has determined that the proposed program to conduct bird damage management in Ohio have no effect on these species. Due to the avoidance of impacts to streams we have no objection to this determination.

Snakes
The project also lies within the range of the **copperbelly water snake** (*Nerodia erythrogaster neglecta*), a federally listed threatened species and the **eastern massasauga** (*Sistrurus catenatus*), a small, docile rattlesnake that is currently a federal candidate species. Habitat requirements for the copperbelly water snake include lowland swamps or other warm, quiet waters (both seasonal and permanent), adjacent wooded migration corridors, adjacent upland slopes with underground hibernation sites below the frost line, and streams or rivers. Eastern massasaugas use both upland and wetland habitat and these habitats differ by season. During the winter, massasaugas hibernate in low wet areas, primarily in crayfish burrows, but may use other structures. Presence of a water table near the surface is important for a suitable hibernaculum. In the summer, massasaugas use drier, open areas that contain a mix of grasses and forbs such as goldenrods and other prairie plants that may be intermixed with trees or shrubs. Adjoining lowland and upland habitat with variable elevations between are critical for the species to travel back and forth seasonally.

Direct Effects
Due to the limited use of the pesticides and bird repellants, there is little data on the potential impacts of these substances on reptile species. Since MA is a naturally occurring chemical it is considered relatively safe. AC should not directly impact reptiles due to its mode of action (Bednarczuk 2010). The specified labeled uses of Mesurol, AC, DRC-1339, and Avitrol and the avoidance of applications near streams and wetlands will reduce potential impacts to these species.

Indirect Effects
The copperbelly water snake feeds primarily on frogs and toads. There is little data on the effect of MA, AC, DRC-1339, or Avitrol on amphibians. You have indicated that AC is not very soluble in water and this should limit its availability to aquatic organisms. Mesurol is toxic to aquatic organisms. The application methods and types of baits that are treated will reduce possible impacts from Mesurol, AC, DRC-1339, and Avitrol to amphibians. In addition, these substances will not be used within aquatic habitats.

The eastern massasauga feeds primarily on small rodents and may attempt to prey on birds. MA and DRC-1339 have a low toxicity to mammals and bioaccumulation of DRC-1339 is not expected to occur. AC can cause temporary sedation of mammals when it is consumed. Mesurol and Avitrol are highly toxic to mammals. Due to the very specific uses of Mesurol, AC, DRC-1339, and Avitrol; and the baiting conditions used to administer them it is not expected that small mammals would consume them and therefore potential impacts to this species are avoided. The eastern massasauga does not commonly feed on birds. Due to the specific target bird species of the bird damage management program, the specific use of the bird repellants, and the high rate that Avitrol and DRC-1339 are metabolized it is not likely that a target bird exposed to these substances would be consumed by this species.

You have determined that this program will have no effect on the eastern massasauga or the copperbelly watersnake. Due to the ecology of these reptile species and the specific labeled uses of the substances described above we have no objection to your determination for these species.

The project lies within the range of the **timber rattlesnake** *(Crotalus horridus horridus)*, a species for which a pre-listing Conservation Plan is being developed. The species is restricted to the un-glaciated Allegheny Plateau and usually occupies forest habitat. The proposed bird damage management program will occur typically in agricultural areas. Due to the project type, description, and specific labeled uses of the chemicals that will be used; no significant impacts to this species are expected.

The project lies within the range of the **Lake Erie Watersnake** (*Nerodia sipedon insularum*), a state endangered species, and a Federal species of concern that was recently removed from the Federal list of Endangered and Threatened Wildlife and Plants due to recovery. The Service continues to monitor the population status of the Watersnake to ensure that it maintains its recovered status. Lake Erie Watersnake summer habitat consists mainly of rocky shorelines with adjacent vegetation and shoreline structures such as crib docks. Winter hibernation habitat for the watersnake includes the island interior and the shoreline/vegetation

interface. Due to the project type, description, limited range of this species, and specific labeled uses of the chemicals that will be used; no significant impacts to the Lake Erie Watersnake are expected.

Amphibians

The proposed project lies within the range of the **eastern hellbender** (*Cryptobranchus a. alleganiensis*), a Federal amphibian species of concern and an Ohio endangered species. The eastern hellbender is a salamander that inhabits perennial streams with large, flat rocks. Since the proposed bird damage program will occur terrestrially, and actions will be taken to prevent runoff of chemical into aquatic resources, no impacts are expected for this species.

Lepidoptera

The proposed project lies within the range of the **Karner blue butterfly** (*Lycaeides melissa samuelis*) and the **Mitchell's satyr** (*Neonympha mitchellii*), both federally listed endangered butterflies. These species have a very restricted habitat and range. The Karner blue butterfly is only located within the Oak Openings region of Lucas County and the Mitchell's satyr is only known from Portage County. In addition, the Mitchell's satyr preferred habitat is sedge-dominated fens with low shrubs and tamaracks. You have indicated that the program will avoid impacts to wetlands. Most of the program is conducted in areas dominated by agriculture or in dense urban areas. You have determined that the proposed program will have no affect to these species. Due to the restricted range of these species and their specific habitat requirements, we have no objection to your determination.

American Burying Beetle

The project area lies within the range of the **American burying beetle** (*Nicrophorus americanus*) a federally listed endangered species. This insect is a generalist as far as habitat preference is concerned, meaning that it can be found in grasslands, open woodlands and brushlands. This species has been reintroduced into the state of Ohio beginning in 1998 and individuals continue to be released throughout the state. This species feeds on the carcasses of dead birds and small mammals. Due to the limited use of the pesticides and bird repellants, there is little data on the potential impacts of these substances on invertebrate species. However, it is known that Mesurol is toxic to honeybees. DRC-1339 and Avitrol are quickly metabolized. In addition, these substances and Mesurol will be used in a very targeted manner, which would significantly reduce the potential for the American burying beetle to feed on any carcasses that had consumed these substances. **WS will coordinate with this office on any bird management activities that incorporate the use of Mesurol, DRC-1339, or Avitrol within Athens, Hocking, Morgan, and Perry Counties.** You have determined that this program may affect but is unlikely to adversely affect this species. Due to the program specifications and the continued coordination with this office, we concur with your determination.

Plants

The proposed program will be conducted within the range of the **eastern prairie fringed orchid** (*Platanthera leucophaea*), **Lakeside daisy** *(Hymenoxys herbacea),* **northern monkshood** (*Aconitum noveboracense*), **running buffalo clover** *(Trifolium stoloniferum*), **small whorled pogonia** (*Isotria medeoloides*), and **Virginia spiraea** (*Spiraea virginiana*).

MA is a naturally occurring chemical and is generally considered as safe. Methicarb, the active ingredient of Mesurol degrades rapidly through soil as photodegredation occurs (Bayer 2010). AC will not accumulate in soil (Rentokil 2005). Avitrol strongly adsorbs to the soil and therefore is relatively immobile (Extoxnet 1996). Avitrol can be translocated within the plant. However, due to the specific use of this substance there is little potential for soil to be contaminated by Avitrol. DRC-1339 binds tightly to soil and degrades rapidly in soil; therefore it would not be expected to be translocated in plants (USDA National Wildlife Research Center 2001).

None of the plant species are known to be pollinated by bird species; however, these species may be pollinated by a variety of insect species. Due to the limited use of the pesticides and bird repellants, there is little data on the potential impacts of these substances on insect species. It is known that Mesurol is highly toxic to honeybees, however due to the multiple types of insects that can pollinate these species no significant impacts to pollination rates of these plants is expected.

WS has determined that this project may affect but is not likely to adversely affect these plant species. If any habitat modification or disturbance is proposed for use within the preferred habitat of these plant species WS has indicated that they will coordinate with the Service and the property owners to avoid impacts to these species. You have indicated that WS personnel are aware of the known locations of listed plant species. **Since new locations of listed plant species are identified on an almost annual basis we recommend that you coordinate with our office to insure that you have the most recent information on locations of rare plants.** Due to the proposed program objectives and methods and the continued coordination with the Service regarding potential impacts to listed plants, we concur with your determination for these species.

The proposed program lies within the range of the **Indiana bat** (*Myotis sodalis*), a federally listed endangered species. Since first listed as endangered in 1967, their population has declined by nearly 60%. Several factors have contributed to the decline of the Indiana bat, including the loss and degradation of suitable hibernacula, human disturbance during hibernation, pesticides, and the loss and degradation of forested habitat, particularly stands of large, mature trees. Fragmentation of forest habitat may also contribute to declines. Most recently white-nose syndrome (WNS), a novel fungal pathogen, has caused serious declines in the Indiana bat population in the northeastern U.S. WNS has also been documented in Ohio and declines of Indiana bats during winter censuses have been noted, but the full extent of the impacts from WNS in Ohio are not yet known.

During winter, Indiana bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

(1) dead or live trees and snags with peeling or exfoliating bark, split tree trunk and/or branches, or cavities, which may be used as maternity roost areas;
(2) live trees (such as shagbark hickory and oaks) which have exfoliating bark;
(3) stream corridors, riparian areas, and upland woodlots which provide forage sites.

The proposed project lies within the range of the **northern long-eared bat** (*Myotis septentrionalis*), a species that is currently proposed for listing as federally endangered. Recently white-nose syndrome (WNS), a novel fungal pathogen, has caused serious declines in the northern long-eared bat population in the northeastern U.S. WNS has also been documented in Ohio, but the full extent of the impacts from WNS in Ohio are not yet known.

During winter, northern long-eared bats hibernate in caves and abandoned mines. Summer habitat requirements for the species are not well defined but the following are considered important:

(1) Roosting habitat in dead or live trees and snags with cavities, peeling or exfoliating bark, split tree trunk and/or branches, which may be used as maternity roost areas;
(2) Foraging habitat in upland and lowland woodlots and tree lined corridors;
(3) Occasionally they may roost in structures like barns and sheds.

Direct Effects
You have indicated that habitat management, which includes removal of trees, would be modified to avoid impacts to bat species. Tree removal would only occur between October 1 and March 31. In addition, WS will coordinate with the Service prior to the removal of any potential Indiana bat maternity roost trees or vegetation removal which could result in the isolation of such a tree. In Ohio there are currently two confirmed hibernacula sites for the Indiana bat. However, there are nine additional sites where fall swarming activity has been documented for the Indiana bat. The habitat around hibernacula is important for male bats that will often spend the summer roosting within the vicinity of a hibernaculum. It is also important for the fall swarming activities of both male and female bats. You have indicated that habitat management, which includes removal of trees, would be modified to avoid impacts to bat species. **Tree removal would only occur between October 1 and March 31. In areas within 10 miles of an Indiana bat swarming site or hibernaculum and areas within 5 miles of a northern long-eared bat swarming site or hibernaculum tree removal should occur between November 15 and March 15.** The Service has provided information on these locations is an attached map. **In addition, WS will coordinate with the Service prior to conducting any tree removal.**

MA has a low toxicity for mammals (Clark 1993). Mesurol is highly toxic to mammals. AC can cause temporary sedation of mammals when it is consumed. Due to the methods of application and the ecology of the Indiana bat and northern long-eared bat there is little potential for exposure to these species from these chemicals. Both of these bat species feed on exclusively on insects. Avitrol is highly toxic to mammals and DRC-1339 is slightly to moderately toxic to mammals. The use of pre-baiting and the type of bait used for target bird species avoids direct impacts to bat species from Avitrol and DRC-1339. The specific labeled use of all these substances minimizes potential direct impacts on the Indiana bat and northern long-eared bats

Indirect Effects
The bird damage management program has the potential to impact the Indiana bat through exposure to toxins or a significant reduction in prey or contamination of prey with bird

repellants or avicides. Toxicity from Mesurol is high for honey bees and aquatic organisms, some of which may become prey for bats when aquatic insects emerge from the water as adults. There is little data on the toxicity of MA, AC, DRC-1339, or Avitrol to insects. Since MA is a naturally occurring chemical it is considered relatively safe. DRC-1339 does not bioaccumulate (USDA National Wildlife Research Center 2001). The specified labeled uses of Mesurol, AC, DRC-1339, and Avitrol and the avoidance of applications near streams and wetlands will reduce potential impacts to insect species which may be prey for the Indiana bat or northern long-eared bat.

MA has a low toxicity for mammals (Clark 1993). Mesurol is highly toxic to mammals. AC can cause temporary sedation of mammals when it is consumed. Due to the methods of application and the ecology of the Indiana bat and northern long-eared bat there is little potential for exposure to these species from these chemicals. Avitrol is highly toxic to mammals and DRC-1339 is slightly to moderately toxic to mammals. The use of pre-baiting and the type of bait used for target bird species avoids direct impacts from Avitrol and DRC-1339. The specific labeled use of all these substances minimizes potential direct impacts on the Indiana bat.

You have determined that the proposed program may affect but is unlikely to adversely affect the Indiana bat. Due to the implementation of seasonal clearing and continued coordination with this office, the Service concurs with this determination. In addition, due to the avoidance and minimization measures listed above, no significant impacts are expected for the northern long-eared bat.

Piping Plover, Rufa Red Knot, Kirtland's Warbler, and Whooping Crane

The proposed program lies within the range of the federally listed endangered **piping plover** (*Charadrius melodus*), and within the vicinity of designated critical habitat for the plover. There are two areas of Critical Habitat for the piping plover in Ohio. Designated critical habitat exists at Sheldon Marsh State Nature Preserve, Huron in Erie County, Ohio and Headlands Dunes State Nature Preserve in Lake County, Ohio. Piping plover habitat includes sand or pebble beaches with sparse vegetation along the shore of Lake Erie. The proposed program also lies within the range of the **rufa red knot** (*Calidris canutus rufa*), a species that is currently proposed to be listed as federally threatened. The red knot is a shorebird that is known to migrate through Ohio during the spring and fall. Red knot migratory stopover habitat includes sand, gravel, or cobble beaches, and mudflats along the shore of Lake Erie.

You have indicated that four conservation measures will be implemented to avoid impacts to these species. The first conservation measure includes coordination between WS, the Service, and ODNR. The second measure states that nets will not be placed within 100 feet of an observed piping plover or red knot. The third measure states that nets will be set to minimize the chance of capture of piping plovers or red knots. The fourth measure state that nets will be observed and if either species is caught it will be immediately removed and released onsite.

The proposed project lies within the range of the **Kirtland's warbler** (*Setophaga kirtlandii*), a federally listed endangered species. The Kirtland's warbler is a small blue-gray songbird with a bright yellow breast. This species migrates through Ohio in the spring and fall,

traveling between its breeding grounds in Michigan, Wisconsin, and Ontario and its wintering grounds in the Bahamas. While migration occurs in a broad front across the entire state, approximately half of all observations in Ohio have occurred within 3 miles of the shore of Lake Erie. During migration, individual birds usually forage in shrub/scrub or forested habitat and may stay in one area for a few days. You have indicated that habitat management may be used to reduce bird damage. **If clearing of vegetation within 3 miles of Lake Erie is required WS will contact this office for further coordination.**

The proposed project lies within the range of the whooping crane (*Grus americana*), a federally listed endangered species. However, this species has not been documented in Ohio.

Direct Effects

The proposed bird damage management program targets avian species that cause damage to agricultural, aquaculture, natural resources and property; or affect public health and safety. Non-target birds could potentially be impacted by the methods of control described. MA is used for taste aversion and therefore bird species are not expected to consume significant quantities of this substance that would lead to harm. AC is used to sedate target birds during live capture. Mesurol, DRC-1339, and Avitrol are highly toxic to bird species. The monitoring during pre-baiting, locations of baiting, type of bait used, and methods administration of these substance minimizes potential impacts from Mesurol, AC, DRC-1339, and Avitrol.

Indirect Effects

The majority of the diet for the piping plover, rufa red knot, and the Kirtland's warbler is insects. These bird species could be indirectly affected by feeding on contaminated prey. Due to the restricted use of some of the chemicals involved in the program there is limited data on toxicity to invertebrates. However, it is known that Mesurol is highly toxic to honeybees and therefore may be toxic to other invertebrate species. Due to the specific applications of Mesurol, exposure to insects is avoided. Since the piping plover, rufa red knot, and the Kirtland's warbler feed on a variety of insects it is highly unlikely that a significant amount of the insects that they consume would be exposed to the chemicals included in the bird damage management program. In addition, all of these species breed outside of Ohio and are only present here for a short amount of time so any potential exposure would be very limited. **You have indicated that you would confer with the Service prior to establishing shorebird capture sites and that you would contact the Service if a Kirtland's warbler is observed.**

You have determined that the proposed program may affect but is not likely to adversely affect these species. Due to the targeting of specific bird species, implementation of avoidance and minimization measures, specific labeled use of the avicides, and continued coordination with this office; we concur with your determination for these species. **We do request that if a piping plover or any other federally listed species gets caught within a mist net, you report the information to our office within 24 hours.**

MIGRATORY BIRD COMMENTS:

The project lies within the range of the bald eagle, a species protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. **According to the 2012**

MOU APHIS will comply with the National Bald Eagle Management Guidelines as appropriate. These guidelines include avoidance of removal of overstory trees within 330 feet of any bald eagle nest regardless of whether or not it is active. Tree clearing should be avoided from 660 feet to 330 feet of nest between mid-January through July. This will prevent disturbance of the eagles from the egg-laying period until the young fledge, which encompasses their most vulnerable times. **We recommend that you consult with this office before conducting vegetation removal within 660 feet of a nest to confirm that the eagles have left the nest.** Once this has been confirmed, tree removal may begin. **You have indicated that all dead and dying birds that have been affected by Avitrol and DRC-1339 will be collected and disposed of to prevent secondary poisoning. In addition, we recommend that any birds shot using lead shot should also be disposed of to prevent possible lead exposure to scavengers including the bald eagle.**

Migratory birds are protected under the Migratory Bird Treaty Act. You have indicated the bird damage management program may include actions under depredation permits and depredation orders. These actions are permitted/reported to the division of migratory birds. The EA indicates that rusty blackbird is a target species. This species is considered a bird of conservation concern within the eastern tallgrass prairie and Appalachian Mountains regions of Ohio (USFWS 2008). **Therefore, we recommend that you contact the region 3 migratory bird division prior to initiating any bird damage management that targets this species.**

The Service recommends that you coordinate with this office to insure that you have information on the most current records of federally listed species as well as the locations of bald eagle nests within Ohio.

This technical assistance letter is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C.661 et seq.), the Endangered Species Act of 1973, as amended, and is consistent with the intent of the National Environmental Policy Act of 1969, and the U.S. Fish and Wildlife Service's Mitigation Policy.

If you have any questions regarding our response or if you need additional information, please contact Jenny Finfera at extension 13.

Sincerely,

Mary Knapp

Mary Knapp, Ph.D.
Field Supervisor

Enclosure: Map of non-roosting habitat for Indiana bats and northern long-eared bats.

cc: DOW, Jennifer Norris, Columbus, OH

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APPENDIX F

WILDLIFE SERVICES CONSULTATION WITH ODW AND ODW RESPONSE

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services

6929 Americana Prkwy
Reynoldsburg, OH 43068

(614) 861-6087
(614) 861-9018 FAX

March 26, 2013

Carolyn Caldwell, Program Administrator
Wildlife Management and Research
Ohio Department of Natural Resources
Division of Wildlife
2045 Morse Road, Bldg. G
Columbus, OH 43229-6693

Dear Ms. Caldwell:

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) requests consultation regarding the effects to State-listed species from a proposed program to conduct bird damage management in Ohio. As a federal agency, the WS program conducts environmental review processes pursuant to the National Environmental Policy Act (NEPA). Currently we are developing an Environmental Assessment (EA) for WS' conduct of a bird damage management program in Ohio.

I have attached the Proposed Action, a list of example bird damage problems typically addressed by WS in Ohio, and a list of methods likely to be employed by WS in Ohio bird damage management programs. WS' has reviewed the current lists of State-listed endangered, threatened, and species of concern in Ohio. The EA identifies several State-listed species as potential targets of the proposed program. These include:

Black tern	(Chlidonias niger)	Endangered
Cattle egret	(Bubulcus ibis)	Endangered
Common tern	(Sterna hirundo)	Endangered
Northern harrier	(Circus cyaneus)	Endangered
Upland sandpiper	(Bartramia longicauda)	Endangered
Peregrine falcon	(Falco peregrinus)	Threatened
Black vulture	(Coragyps atratus)	Species of Concern
Great egret	(Ardea alba)	Species of Concern
Sharp-shinned hawk	(Accipiter striatus)	Species of Concern

WS conducts bird damage management activities on private and public lands at the request of the property owner or manager and employs an integrated wildlife damage management (IWDM) approach. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing the harmful effects of damage management measures on humans, target and non-target species, and the environment. Under the proposed action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods. When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be humanely removed using: shooting, trapping, and registered pesticides. In

determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where the application of lethal methods alone would be the most appropriate strategy.

Although the above mentioned State-listed T&E species are potential targets of the proposed action they are not likely targets for lethal control methods. The following table indicates the fate of those State-listed T&E species that were targets for the current WS OH bird damage management program from 2007-2011.

Species	State Status	Harass	Relocate	Lethal
Black Tern	Endangered	-	-	-
Black Vulture	Species of Concern	2757	-	20
Cattle Egret	Endangered	-	-	-
Common Tern	Endangered	-	-	-
Great Egret	Species of Concern	71		
Northern Harrier	Endangered	99	-	-
Peregrine Falcon	Threatened	71	1	-
Sharp-shinned hawk	Species of Concern	3	-	-
Upland Sandpiper	Endangered	3	-	-

With the exception of the black vultures, those T&E species addressed during bird damage management activities were involved in threats to aviation safety. Harassment techniques described in Appendix C of the EA such as auditory and visual scarring devices are frequently used to discourage birds on or near airport property if they pose a threat to aviation/human safety. In addition to harassment, WS personnel may employ or recommend the use of habitat modification or the installation of exclusionary materials to minimize the potential threats associated with bird species on or near airport property.

Although black terns, common terns, and cattle egrets have not been addressed by WS during bird damage management activities since 2007, they are analyzed as target species of the proposed action because of their potential to be associated with threats to aviation/human safety on or near airport property. As discussed above, these species would not be likely targets for lethal management methods, but non-lethal methods, such as harassment techniques, could be employed to reduce threats associated with these species. In the highly unlikely event that WS determines the need for lethal take of any Ohio-listed T&E species WS would further consult with the Ohio Department of Natural Resources (ODNR) and take would only occur pursuant to the appropriate U.S. Fish and Wildlife Service (USFWS) and ODNR permits. Capture and relocation of Ohio-listed T&E raptor species would be done in accordance with the Raptor Relocation Plan between Ohio WS and ODNR, which was completed in 2009.

The black vultures addressed by WS were associated with damage to a variety of properties such as landfills, prisons, private property and universities. The damage associated with black vultures typically included livestock predation and damage to building/structures. Lethal removal of vultures may be used to reinforce the effectiveness of other damage management techniques. The take of black vultures would only occur when authorized through the issuance of depredation permits by the USFWS and ODNR.

WS believes that the proposed action and methods will not adversely affect Ohio-listed threatened and endangered (T&E) species. At this time we are seeking input from the ODNR regarding the potential for WS' bird damage management program and activities to impact Ohio T&E species. We intend to incorporate your input into this EA prior to its release for public review and comment.

Please contact me at (614) 861-6087 if you have any questions or if I can provide further information.

Sincerely,

Andrew J. Montoney
State Director, Ohio Program
USDA-APHIS-WS

SUMMARY OF THE PROPOSED ACTION

The current and proposed program is an adaptive integrated Ohio WS bird damage management program for the protection of agricultural and natural resources, aquaculture, property, and public health and safety. Wildlife Services would continue to respond to requests for assistance with, at a minimum, technical assistance, or where appropriate and permitted by the USFWS and ODNR, operational damage management. The IWDM approach would allow for the use of legally available nonlethal and lethal bird damage management methods, either singly or in combination, to meet requester needs for reducing bird damage (Appendix C). Agricultural producers, airport managers, property owners and others requesting assistance would be provided information regarding the use of effective non-lethal and lethal techniques, as appropriate. Preference will be given to the use of nonlethal methods where practical and effective. Non-lethal methods include, but are not limited to, lure crops, environmental/habitat/behavior modification, decoy traps and other live traps, exclusionary devices, nest destruction, chemical repellents, reproductive inhibitors, and alpha chloralose (AC). Lethal methods considered by WS include: shooting, egg addling/ destruction, snap traps, DRC-1339, and euthanasia techniques, such as CO_2. WS may recommend hunting or DPs to resource owners when these methods are deemed applicable to certain bird damage management situations. Bird damage management would be conducted on private or public property where a need has been documented, WS assistance has been requested, and an *Agreement for Control* or other comparable document has been completed. All management actions would comply with applicable State, Federal and local laws and regulations.

Example/Typical Bird Damage Problems Addressed By WS in Ohio

1. **Disease transmission.** Birds can be vectors of diseases that can be transmittable to humans or they may act as reservoirs for a disease which subsequently infects a host that spreads the disease to humans.

2. **Aviation safety.** Bird collisions with aircraft (bird strikes) kill birds, damage aircraft and pose a serious risk to public safety. Between 1990 and 2009 there were 11,110 wildlife strikes in the U.S. that caused damage to aircraft, of these 92% were caused by birds (Dolbeer et al. 2011).

3. **Property damage.** Property damage caused by birds can entail numerous resources such as woodpecker damage to residential dwellings or house sparrows and starlings may damage buildings by pecking foam insulation and create aesthetic problems with their droppings and nesting materials. Instances of property damage from birds may include Canada Geese defacing property due to overgrazing and deposition of large amounts of fecal material. Birds can also cause damage to electrical utility structures.

4. **Livestock feed.** Bird damage to agricultural crops has cost U.S. farmers more than $100 million annually (Besser 1985) and can pose significant economic threats to agricultural producers (Besser et al. 1968, Dolbeer et al. 1978, Feare 1984). Cattle in feedlots and dairies provide a tremendous feeding opportunity for birds. Starlings and other birds may select for grains found in cattle silage, thereby altering the composition and energy value of the feed.

5. **Aquaculture resources.** Bird damage to aquaculture resources can have significant economic impacts. Hoy et al. (1989) estimated that wading birds feeding at a minnow facility may consume

$0.10 to $1.12 per bird which could translate into a loss in excess of $10,000 for a three month period. In a survey of fish hatcheries in the eastern United States, Parkhurst et al. (1987) estimated that most hatcheries lost in excess of $7,600 worth of fish production to bird predation annually.

6. **Field crops.** Canada Geese and blackbirds can cause considerable damage to field crops.

7. **Livestock health.** Pigeons, starlings, sparrows, and blackbirds have been implicated in the transmission of diseases significant to livestock production. Pigeons and starlings have been shown to be vectors of transmissible gastroenteritis (TGE) virus of swine. Cryptococcosis is a fungal disease spread by pigeons and starlings to livestock that may result in chronic, usually fatal, meningitis.

8. **Nuisance problems.** Certain bird species and their associated nesting material and droppings may create nuisances or safety hazards. Accumulations of pigeon droppings may produce an objectionable odor. Pigeon manure deposited on park benches, cars, statues, and unwary pedestrians is aesthetically displeasing. House Sparrows may also create fire hazards by placing nesting material near electrical wiring and light fixtures. Gulls create nuisances when they nest on roof tops and attempt to gain food from people eating outdoors (Dolbeer et al. 1990). Excessive amounts of gull droppings on other structures, such as an USACE river lock, can cause slippery walking conditions and pose human safety threats after rainfall. Additionally, fecal accumulations from starlings have caused a slipping hazard on catwalks at industrial plants (along with a fire hazard at oil refineries).

9. **Natural resources.** Encroachment by some bird species is a concern of some resource management agencies. Starlings usurp nest sites from Wood Ducks (*Aix sponsa*), bluebirds (*Sialia* spp.), woodpeckers, and many other cavity nesters (Grabill 1977, Weitzel 1988, Ingold 1989). Brown-headed Cowbirds parasitize songbird nests, leading to concern by some wildlife biologists for the well-being of neotropical migrant species (Brown 1994).

APPENDIX C

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE IN OHIO

The most effective approach to resolving wildlife damage problems is to integrate the use of several methods, either simultaneously or sequentially. Integrated Wildlife Damage Management would integrate and apply practical methods to prevent and reduce damage by wildlife while minimizing harmful effects of damage reduction measures on humans, other species, and the environment. Integrated Wildlife Damage Management may incorporate resource management, physical exclusion and deterrents, and population management, or any combination of these depending on the characteristics of specific damage problems.

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

A variety of methods (Table C-1) are potentially available to the WS program in Ohio for the management or reduction of bird damage. WS develops and recommends or implements IWDM strategies based on resource management, physical exclusion and wildlife management approaches. Within each approach there may be a number of specific methods or tactics available.

Various Federal, State, and local statutes and regulations and WS Directives govern WS use of damage management tools and substances. The following methods and materials are recommended or used in technical assistance and operational damage management efforts of the WS program in Ohio. The effectiveness of the program can be defined in terms of reduced economic losses, decreased health hazards,

Table C-1. Bird Damage Management Methods which would be Recommended or Used by WS under each Alternative.

Management Method	Alternative 1 Current Program	Alternative 2 Only Nonlethal	Alternative 3 No Program
Habitat Management	✓	✓	No
Lure Crops/Cultural	✓	✓	No
Human Behavior	✓	✓	No
Exclusion	✓	✓	No
Frightening Devices	✓	✓	No
Repellents	✓	✓	No
Reproductive Inhibitors	✓[1]	✓[1]	No
Live Traps	✓	✓	No
Alpha-chloralose [2, 3,4]	✓	✓	No
Egg oil/addle/destruction	✓	No	No
Shooting	✓	No	No
DRC-1339 [2, 3]	✓	No	No
Avitrol[2]	✓	No	No
Euthanasia	✓	No	No
Hunting/DPs	✓	No	No

1 Depends on legal availability of this method in Ohio.
2 Only certified applicators could use.
3 Only registered for USDA-APHIS-WS use.
4 When used as a nonlethal technique birds captured with AC would not be killed.

minimized property damage and overall improved quality of life.

NONLETHAL METHODS

Resource Management: Resource management includes a variety of practices that may be used by resource owners to reduce the potential for wildlife damage. These practices may include indoor feeding of livestock, changing flight patterns to avoid times of high bird activity, and removing habitat features that are attractive to damaging species.

Alter Aircraft Flight Patterns

In cases where the presence of birds at airports results in threats to air traveler safety and when such problems cannot be resolved by other means, the alteration of aircraft flight patterns or schedules may be recommended. However, altering operations at airports to decrease the potential for hazards is not feasible unless an emergency situation exists. Otherwise, the expense of interrupted flights and the limitations of existing facilities make this practice prohibitive

Cultural Methods

These generally involve modifications to the level of care or attention given to the resource, which may vary depending on the age, size, and location of the resource. Husbandry practices include but are not limited to techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994). Cultural methods may also include selection of crops/plants which are not as attractive to foraging birds or selecting short-season crops which can be harvested before migration season.

Environmental/Habitat Modification

Habitat modification is an integral part of bird damage management. The type, quality, and quantity of habitat are directly related to the wildlife that use that habitat. Therefore, habitat can be managed to not attract certain bird species or even to repel certain birds. Most habitat management revolves around airports and bird aircraft strike problems in Ohio. Habitat management around airports is aimed at eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water on the airfield. Habitat management is often necessary to minimize damage caused by blackbirds and starlings that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand. Roosts often will re-form at traditional sites, and substantial habitat alteration is the only way to permanently stop such activity (USDA 1997 revised).

Human Behavior Management

Human behavior management involves educating and encouraging members of the public to engage in behaviors which minimize the risk of conflicts with wildlife. These behaviors may include encouraging people to not feed birds at parks and other locations, and helping municipalities establish regulations prohibiting bird feeding at parks and other public areas. It may also include public education on the importance of proper waste disposal, encouraging the use of trash receptacles that restrict access by birds

Lure Crops/Alternate Foods

When depredations cannot be avoided by careful crop selection or modified planting schedules, lure crops can sometimes be used to mitigate the loss potential. Lure crops are planted or left for consumption by wildlife as an alternative food source. This approach provides relief for critical crops by sacrificing less important or specifically planted fields. Establishing lure crops is sometimes expensive, requires considerable time and planning to implement, and may attract other unwanted species to the area.

For lure crops to be effective, the ability to keep birds from surrounding fields would be necessary, and the number of alternative feeding sites must be minimal (Fairaizl and Pfeifer 1988). Additionally, lure crops reduce damage for only a short time (Fairaizl and Pfeifer 1988). The resource owner is limited in implementing this method contingent upon ownership of, or otherwise ability to manage the property. Unless the original bird-human conflict is resolved, creation of additional habitat or feeding sites could increase future conflicts.

Lure crops would likely be planted on some land held in private ownership, such as conservation clubs, throughout Ohio. These plantings may provide some additional food or act as an attractant for birds. However, it is highly unlikely they contribute to conflicts with birds or act as significant attractants when one considers that millions of acres of the State are in corn, wheat, hay and soybean production which provides high quality foods for much of the year.

Contraception: Inhibiting reproduction is one way of reducing some bird populations. However, in long-lived species like geese (Cramp and Simmons 1977) exclusive use of contraceptive methods may take a period of years to reduce local bird populations. Contraceptive methods are likely to be most valuable as a means of maintaining waterfowl populations at desired levels.

Canada Geese have been successfully vasectomized to prevent production of young; this method is only effective if the female does not form a bond with a different male. In a study conducted at the NYC Bronx Zoo, females failed to maintain pair bonds with vasectomized males and did lay fertilized eggs (N. Clum, Assistant Curator of Ornithology, Bronx Zoo, pers. comm., July 2009). In addition, vasectomies can only prevent the production of the mated pair. The ability to identify breeding pairs for isolation and to capture a male bird for vasectomy becomes increasingly difficult as the number of birds increase (Converse and Kennelly 1994). Keefe (1996) estimated mechanical sterilization of a Canada goose to cost over $100 per bird. Additionally, as is the case with most procedures involving anesthesia in wild animals, some birds will likely die from the procedure.

The NWRC has been instrumental in the development and registration of a new product, nicarbazin (OvoControl-GTM; CAS 330-95-0/4,4-dinitrocarbanilide (DNC, CAS 587-90-6)/ 2-hydroxy-4,6-dimethylpyrimidine (HDP, CAS 108-79-2) (1:1)), which is an infertility agent for Canada geese and Rock Pigeons in urban areas. Nicarbazin is available to certified pesticide applicators and is not restricted to use by WS. Use of baits containing nicarbazin would allow the numbers of small to moderate sized groups of Canada geese and Rock Pigeons to be controlled by reducing the hatchability of eggs laid by treated birds without

requiring the location of each individual nest to be determined (as is the case for egg oiling/addling/destruction). Currently it is not registered for use in the state of Ohio.

Nicarbazin is thought to induce infertility in birds by two main mechanisms. Nicarbazin may disrupt the membrane surrounding the egg yolk, resulting in intermixing of egg yolk and white (albumin) components, creating conditions in which the embryo cannot develop. Nicarbazin may also inhibit incorporation of cholesterol into the yolk, a step that is necessary for yolk formation, thereby limiting energy for the developing embryo. If the yolk does not provide enough energy, the embryo will not completely form and the egg will never hatch. Nicarbazin bait must be consumed for several days to achieve blood levels that affect the hatchability of eggs that are forming. Nicarbazin is undetectable in the plasma of Canada Geese, Mallards, and chickens by 4-6 days after consumption of nicarbazin bait has stopped. The levels of active ingredient in the blood are reduced by half within one day after bait consumption stops. If the level of active ingredient falls by approximately one half its peak levels, no effects on egg formation can be seen. By two days after bait consumption has stopped, no effects on the egg being formed are seen. Consequently, the bait must be offered to the birds each day of the nesting period for best impact on reproduction.

In a field study conducted in Oregon (Yoder et al. 2005), use of nicarbazin reduced hatchability of eggs 35.6% ($P = 0.062$). When considering the success of individual nests at sites rather than flocks as a whole, percent hatchability was significantly reduced 50.7% ($P < 0.001$). The high degree of variability among Canada Geese in their movement patterns, nesting and habitat use complicates use of this product (Vercauteren and Marks 2004). The variability in goose behavior can make it difficult to get the required doses to the geese. Under current label guidelines, the cost for nicarbazin (Ovocontrol®) applications exceeds the cost of other control methods (Cooper and Keefe 1997) until the goose population reaches a critical threshold of approximately > 80 birds (Caudell and Shwiff 2006). Research conducted on captive pairs of Rock Pigeons use of nicarbazin resulted in 59% reduction in the number of eggs hatched (Avery et al. 2007, unpub. report).

Nicarbazin can be expensive to use. For example, the label for pigeons recommends approximately 1 lb. of bait per day for approximately 80 pigeons and 5 lbs. of bait per day for 400 pigeons. At this rate, and an estimated cost of $6.80 per pound, the bait to treat a group of pigeons during a 6 month (180 day) breeding period would cost approximately $1,224 for an 80-bird flock and $6,120 for a 400 bird flock (Innolytics 2009). This cost estimate does not include staff time required to appropriately apply the bait. Pigeons must be conditioned to the baiting program for a period of roughly 5-14 days. The site must be visually observed daily during the conditioning period to ensure that non-target species are not feeding on the bait and to accurately determine the amount of bait to be used. All bait should be consumed within one hour of application. Unconsumed bait must be collected at the end of the feeding period. During observation periods, applicator must remain on-site until all bait is consumed or removed from the site. After the conditioning period, the flock must be visually observed weekly to ensure that adequate amounts of bait are being provided, that all bait is being consumed and that non-target species have not started using the site. The product may not be applied if non-target species are observed eating the bait.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners, or where the presence of birds is

a safety risk at or near airports. This method can be used with single nests for species such as hawks, or for colony nesting birds such as gulls. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations.

Animal Behavior Modification: This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may include scare tactics or exclusion to deter or repel birds that cause loss or damage (Twedt and Glahn 1982). Some but not all devices used to accomplish this are:

- Exclusion (fencing and other barriers)
- Harassment including auditory scaring devices (*i.e.*, electronic guards, propane exploders, pyrotechnics, distress calls and sound producing devices), visual repellents/scare devices (lasers, scarecrows, falconry), and physical harassment (remote control devices, dogs)
- Chemical repellents (*i.e.*, mesurol, anthraquinone)

Exclusion

Exclusion involves physically blocking bird access to a site. Like habitat management, physical exclusion can provide a long-term nonlethal solution for deterring bird use of a structure or a site. Because of the cost involved in materials, construction and maintenance and the physical limitations of the systems, these methods are generally only practical for small areas and a limited number of species. Exclusion adequate to stop bird movements can also restrict movements of people, equipment and other wildlife (Fuller-Perrine and Tobin 1993). Some physical exclusion devices may be an impediment to the intended use of a site and some landowners, managers and users may consider the aesthetic impacts of physical exclusion devices to be unacceptable. Physical exclusion methods may be prohibitively expensive for some locations. Physical exclusion methods which may be useful at off-airport sites include:

Bird Barriers - Bird proof exclusions can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which require overhead barriers as well as conventional perimeter netting. Buildings and other areas could be "bird proofed" using hardware cloth or netting. Heavy plastic strips hung vertically in open doorways have been successful in some situations in excluding birds (Johnson and Glahn 1994).

Perching Deterrents - Perching deterrents are available in a wide variety of designs (Internet Center for Wildlife Damage Management 2009). Porcupine wire (e.g., Nixalite™, Catclaw™) and coil wire are mechanical repellent methods that can be used to exclude pigeons and other birds from ledges and other roosting surfaces (Williams and Coorigan 1994, Avery and Genchi 2004). The sharp points inflict temporary discomfort on the birds as they try to land, which deters them from roosting. Drawbacks of this method are that some pigeons have been known to build nests on top of porcupine wires and the method can be expensive to implement if large areas are involved.

Electric shock bird control systems are available from commercial sources and, although expensive, can be effective in deterring pigeons and other birds from roosting on ledges, window sills and other similar portions of structures (Williams and Corrigan 1994).

Surface Coverings - Some bird species may be excluded from ponds, fields or other areas using overhead wire grids (Pochop et al 1990, Fairaizl 1992, Lowney 1993). These lines should be made visible to the birds by hanging streamers or other objects at intervals along the wires. The objective is to discourage bird feeding activities and not cause bird injury or death. Overhead wire networks generally require little maintenance other than maintaining proper wire tension and replacing broken wires, and the spacing varies with the species being excluded. They have also been demonstrated to be most applicable on areas less than two acres, but may be considered unsightly or aesthetically unappealing to some people. Wire grids can render a pond unusable for boating, swimming, fishing, and other recreational activities. Installation costs are about $1,000 per surface acre for materials. The expense of maintaining wire grids may be burdensome for some people. Floating mats and balls approximately five inches in diameter can be used to cover the surface of a pond. Floating mats and "ball blankets" renders a pond unusable for boating, swimming, fishing, and other recreational activities.

Harassment

Harassment and frightening devices are those methods used to frighten birds away from an attractive resource. Harassment may be used in areas where physical exclusion and habitat management are not acceptable or feasible because of intended use of the site, perceived adverse aesthetic impacts of the habitat modification or exclusion device, or other site characteristics. Harassment may also be used as a short-term management alternative until more permanent methods (e.g., elimination of perching or nesting sites) can be implemented (Seamans and Helon 2006). Hazing with pyrotechnics, dogs, and lasers has become a popular means of repelling Canada Geese from urban and suburban sites such as parks, golf courses and cemeteries where there are problems with damage to vegetation and fecal contamination (Castelli and Sleggs 2000, Swift 2000, York et al. 2000, Holvinski et al. 2007, Preusser et al. 2008).

One of the primary limitations to the use of harassment programs is that birds often become accustomed to (habituated to) the frightening stimuli and may cease to respond to the stimulus(Bomford and O'Brien 1990). Birds may also learn to associate the stimulus with a particular person and vehicle and only attempt to use the site when the person/vehicle has left the site. Alternating and/or mixing frightening devices can help to reduce problems with habituation. Changing the location and the pattern (e.g., frequency of light and sound emission) of the frightening stimulus can also help problems with habituation. There are fewer problems with physical harassment (e.g., harassment by a person, animal or remote-controlled device) than other forms of harassment because of the actual threat of contact, injury or capture by the source of the harassment).

Harassment systems do not eliminate the original attractant so birds are likely to try to return to the site and new birds may be attracted to the area unless some form of exclusion or habitat modification can be implemented (Holevinski et al 2007, Preusser et al. 2008). Holevinski et al (2007) found that geese hazed from an area using pyrotechnics returned to the area within 1-25 minutes. Using multiple techniques instead of only pyrotechnics will increase the chances of successful harassment (Holevinski et al 2007). In the study of an integrated harassment and egg-oiling program in Orange County, NY, geese did not move far from the areas in which they were being hazed (Preusser et al. 2008). Twelve of the 59 geese banded at one of the parks were observed at an unmanaged location 0.7 miles away on 161 occasions during the same year. While the number of geese utilizing the managed locations dropped, there was a corresponding rise in geese at unmanaged areas within 1.8 miles of the managed locations.

Acoustic Frightening Devices – This class of harassment methods may include propane exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations. Acoustic frightening devices are often not practical in suburban, urban or rural areas if they disturb people or pets. Pyrotechnics used as scare devices may be a temporary solution until geese become accustomed to the noise (Heinrich and Craven1990). In addition, under large feedlot situations they may not be appropriate because of the disturbance to livestock, although livestock would eventually habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics (Bomford and O'Brien 1990).

Scarecrows - The use of scarecrows has had mixed results. These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972, Bomford and O'Brien 1990). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988). In general, scarecrows are most effective when they are moved frequently, alternated with other methods, and are well maintained.

Dogs - Dogs can be effective at harassing birds and keeping them off turf and beaches (Conover and Chasko 1985, Woodruff and Green 1995). Around water, this technique appears most effective when the body of water to be patrolled is $\leq$ 2 acres in size (Swift 1998). In New York, use of dogs was particularly effective when combined with remote controlled boats to harass geese that had moved into the water to avoid the dogs (Pecor et al. 2007). Although dogs can be effective in keeping birds off individual properties, they do not contribute to a solution for the larger problem of overabundant/anthropogenic abundant bird populations (Castelli and Sleggs 1998). Swift (1998) and numerous individuals in New York have reported that when harassment with dogs ceases, the number of birds usually return to pre-treatment numbers. WS has recommended and encouraged the use of

dogs where appropriate.

Falconry - Falconry is the practice of using falcons and hawks to chasing/hunt other wildlife species and return to the handler. It is regulated under both Federal and State laws and all raptors in the United States are protected under various statutes; any "take" of a raptor must be done under the appropriate permit to be legal. The care and housing of falcons can be expensive (Chamorro and Clavero 1994) and there are drawbacks to using falcons to disperse birds from damage or potential damage sites (Hahn 1996) (*i.e.*, falcons are generally only flown when weather and lighting condition permit).

Laser - Lasers are a relative new technique used to frighten and disperse birds from their roosts or loafing areas. Although the use of a laser (the term of "laser" is an acronym for Light Amplification by Simulated Emission of Radiation) to alter bird behavior was first introduced nearly 30 years ago (Lustick 1973), it received very little attention until recently when it was tested by the NWRC. Results have shown that several bird species, such as Double-crested Cormorants, Canada Geese, other waterfowl, Gulls, Vultures (*Cathartes aura* and *Coragyps atratus*), and American Crows have all exhibited avoidance of laser beams during field trails (Glahn et al. 2001, Blackwell et al. 2002). The repellent or dispersal effect of a laser is due to the intense and coherent mono-wavelength light that, when targeted at birds, can have substantial effects on behavior and my illicit changes in physiological processes (APHIS 2001). Best results are achieved under low-light conditions (*i.e.*, sunset through dawn) and targeting structures or tree proximate to roosting birds, thereby reflecting the beam. In field situations, habituation to lasers has not been observed (APHIS 2001).

The avian eye generally filters most damaging radiation (*e.g.*, short-wavelength radiation from the sun). In tests conducted with Double-crested Cormorants exposed to a relatively low-power Class-III B laser at a distance of 1 meter, no ocular damage was noted (APHIS 2001). However, unlike birds, the human eye, with the exception of the blink reflex, is essentially unprotected from thermal damage to retinal tissue associated with concentrated laser radiation. Lasers used by WS include the Class-III B, 5-mW, He-Ne, 633-nm Desman laser, and the Class II, battery-powered, 68-mW, 650-nm, diode Laser Dissuader. Because of the risk of eye damage, safety guidelines and specifications have been developed and are strictly followed by the user (Occupational Safety and Health Administration 1991, Glahn and Blackwell 2000).

Spotlights - The use of light to disturb or move loafing and or roosting birds can be an effective technique if the harassment is maintained over a long period of time (VerCauteren et al 2003). This method is similar to the laser, but has a much reduced price. The sacrifice in reduced pricing also limits the range and effectiveness of this method when compared to the laser.

Remote Control Devices - The use of remote control devices for the purpose

of disturbing the activity or behavior of birds is a relatively new concept. These devices have been in existence for many years, but their durability, range, strength and cost have improved dramatically. Remote control devices are available in numerous forms such as: speed boats, helicopters, airplanes, sail boats, race cars, etc. Holevinski et al (2007) reported that in trials with the use of remote control boats and border collies they were able to remove >90% of geese 97% of the time; however the geese returned within 30 minutes.

Chemical Repellents

Bird repellents may be used to reduce bird feeding on plants, repel birds from temporary pools of standing water, and have been used as a tactile repellent to prevent perching on building ledges and similar locations. Products available for use include but are not limited to:

Methyl Anthranilate (MA) - MA is artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. MA is currently registered as a repellent to protect turf from bird grazing and as a spray for airport runways to reduce bird activity/risk on or near airports. It is also been investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or the FDA.

Mesurol - This chemical repellent is used for non-lethal taste aversion. It is registered by the EPA for aversive conditioning egg treatment to reduce predation from common ravens, white-necked ravens (*C. cryptoleucas*), and American crows on the eggs of protected, T/E species, or eggs of other species designated to be in need of special protection (EPA Reg. No. 56228-33). Mesurol is registered for WS use only. The active ingredient is methiocarb which is a carbamate pesticide which acts as a cholinesterase inhibitor. Species which feed upon treated eggs may show signs of toxicity (*e.g.* regurgitation, lethargy, temporary immobilization). Occasionally, birds may die after feeding upon treated eggs, but most birds exposed to treated eggs survive. Avery et al. (1995) examined the potential of using eggs injected with 30mg of mesurol to condition ravens from preying on eggs of endangered California least terns (*Sterna antillarum*). The result concluded that proper deployment of treated eggs can be a useful, nonlethal method of reducing raven predation at least tern colonies. Avery and Decker (1994) evaluated whether predation might be reduced through food avoidance learning. They used captive fish crows (*Corvus caurinus*) to examine avoidance response from mesurol (18mg/egg) and MA (100mg/egg). Their conclusion showed that some crows displayed persistence to the 5-day exposure and that successful application may require extended period of training for target predators to acquire an avoidance response. During the spring of 2001, WS conducted a field test on the Sterling Wildlife Management Area in Bingham County, Idaho, where mesurol treated eggs were exposed to black-billed magpies (*Pica pica*) to evaluate aversive

conditioning to eggs of waterfowl and upland game birds. Magpies feeding on treated eggs decreased after a short period of time, however, their feeding behavior switched to pecking holes in eggs, possibly trying to detect treated eggs before consuming them. This behavior may suggest that at least some birds experienced the ill effects of mesurol, but the *"tasting"* of eggs may result in increased predation (Maycock and Graves 2001).

Anthraquinone (Flight Control™) - Anthraquinone is a non-lethal repellent currently registered in the United States for use on geese. 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). Additional bird-repellent applications are being developed for rice and corn seed treatments and aerial application to ripening rice (Avery 2003). 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). Anthraquinone is a secondary repellent and affects birds by causing post-intestinal distress. Sometimes ingestion of anthraquinone-treated food produces vomiting, but often vomiting does not occur and the bird just sits quietly until the discomfort passes. Anthraquinone is not a taste repellent or contact irritant as the birds do not hesitate to eat treated food, and they exhibit no sign that treated food is unpalatable to them. However, once the birds experience the adverse consequences they learn to avoid the protected food.

Anthraquinone is a stable compound and virtually insoluble in water and there are no known hazards to non-target species from repellent application of anthraquinone. It is not phytotoxic and does not inhibit germination of rice seeds or growth of sprouts. It also has a very low toxicity to birds and mammals, and it appears to be innocuous to insects (Avery 2003). Anthraquinone is not registered for use in Ohio.

Tactile repellents - A number of tactile repellent products are on the market, which reportedly deters birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason et al. 1989). The repellency of tactile products is generally short-lived because of dust, and they sometimes cause aesthetic problems and expensive clean-up costs by running down the sides of buildings in hot weather. Tactile repellents are unsuitable for use with waterfowl and are unlikely to be useful on the scale needed to address off-airport problems with flocks of feeding and roosting blackbirds, crows, Rock Pigeons, or House Sparrows. Consequently, this method is not being advanced for further analysis.

Other Chemical Repellents - A number of other chemicals have shown bird repellent capabilities and new nonlethal repellents may become available in the future. Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting Starlings (Clark 1997). Naphthalene (moth balls) was found

to be ineffective in repelling starlings (Dolbeer et al. 1998). In the event that new repellents become available, WS will evaluate the products to determine if they have potential environmental impacts which have not been addressed in the EA and supplement the analysis as appropriate in accordance with the NEPA.

Live Capture Methods can be used the WS program for disease surveillance, research, and damage management. Live-captured birds may be released on site (e.g., disease surveillance, research), relocated, or euthanized depending upon the species and circumstances of the project (see Relocation and Lethal Methods sections below). Non-target species may be captured in some of these devices, but in most cases it is possible to release non-target species unharmed.

Clover, Funnel, and Common Pigeon Traps
These traps are enclosure traps made of nylon netting or hardware cloth and come in many different sizes and designs, depending on the species of birds being captured. The entrances of the traps also vary greatly from swinging-door, one-way door, funnel entrance, to tip-top sliding doors. Traps are baited with grains or other food material, which attract the target birds. WS' standard procedure when conducting trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds.

Cage Traps
This category of traps represents a wide variety of traps including decoy traps and Swedish goshawk traps. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Swedish goshawk trap construction and use is described in Meng (1971). These traps are used to capture raptor species such as Red-tailed Hawks. They are most often used at airports to remove raptors that pose bird strike risks to aircraft, but can be used to remove individuals that are depredating on captive waterfowl or chickens. Birds caught in Swedish goshawk traps are most often relocated, but in some cases they are euthanized.

Nest Traps
Nest traps are used by WS to capture birds on a nest. Nest box traps are used to capture cavity nesters such as European starlings to prevent breeding activity by this non-native species. They can also be used to catch native birds such as American kestrels in sensitive areas such as airfields. Nest traps similar to funnel traps have been placed over the nests of ground nesting birds such as gulls to capture the adults.

Mist Nets
Mist nets are most commonly used for capturing small-sized birds such as house

sparrows, finches, etc. but can be used to capture larger birds such as ducks and ring-neck pheasants (*Phasianus colchicus*). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net. Dho gazzas are net systems similar to mist nets. They are designed capture raptors.

Cast Nets, Landing Nets, and Hand Nets
These types of capture methods employ nets that are thrown or dropped over a target species. Hand nets are used to capture injured birds, or birds restrained in another larger type of trap (e.g., corral trap, or large cage traps. They are also used inside buildings to capture birds and remove them from public areas.

Powered Nets
Powered nets include bow nets and similar devices. They usually include a net attached to a round or square hinged, spring-loaded frame. One side of the frame is folded back and secured by a device attached to a trigger. When the trigger is released the frame springs back into place pulling the net over the bird. These devices can be trigged by a pan with bait attached to it or by remote control.

Propelled Nets
This category of capture devices includes cannon nets, rocket nets, Coda net guns (shoulder and ground mounted), and the Super Talon net gun. The cannon and rocket nets, and the Coda ground mounted system are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds, which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds which are typically shy to other types of capture. The net guns are usually used to capture species like gulls, waterfowl, and raptors. The Coda net guns use a blank .308 rifle cartridge for propulsion and the Super Talon uses compressed air cartridges for propulsion. The net is propelled from the shoulder-mounted or hand held device over the target.

Pole traps
Pole traps are generally set for raptors which perch on poles prior to making an attack. Problem hawks and owls can be safely trapped using a well-padded (*i.e.*, with foam rubber wrapped in electricians tape, surgical tubing) steel leg-hold trap (No. 1½ or other appropriate size), snare or tangle snares set on the top of poles. Poles that are 5 to 10-foot high near the threatened area where they can be seen easily and place one padded trap on top of each pole. The wire is run through the trap ring and the wire is secured to the pole and ground so that trapped birds may slide to the ground where the bird can rest. 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.

Bal-chatri Traps and Noose Mats
These traps are used for capturing birds of prey such as hawks and eagles. Live bait such as pigeons, starlings, rodents, etc. is used to lure raptors into landing on the trap

(Hygnstrom and Craven 1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material and formed into a Quonset hut shape cage which holds the live bait. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string. Noose mats use a series of small nooses on a mat similar to nooses used on Bal-chatri traps and are used to live-capture shorebirds (Mehl et al. 2003).

Alpha chloralose (AC)

AC is a chloral derivative of glucose and a central nervous system depressant (*i.e.*, depresses cortical centers in the brain) used as an immobilizing agent to capture and remove waterfowl and other birds causing a nuisance, and for capture of birds for research purposes[1]. It is labor intensive and in some cases, may not be cost effective depending on the application and purpose (Wright 1973, Feare et al. 1981), but is typically used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts and for the capture of birds for research. Alpha chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans and the target birds. Single bread or corn baits are fed directly to the target birds. Wildlife Services personnel or other authorized personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Wildlife Services is currently authorized by FDA to use AC to capture waterfowl, coots, pigeons and ravens under Investigative New Animal Drug (INAD) 6602 under a category of nuisance animals.

Alpha chloralose was eliminated from more detailed analysis in USDA (1997 Revised) based on critical element screening; therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. AC is used in other countries as an avian and mammalian toxicant. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about 2 to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Wornecki et al. 1990) but the compound is not generally soluble in water and therefore should remain unavailable to aquatic organisms. Because of the method of delivery, water contamination is highly unlikely.

Relocation has been used with some success for low abundance species such as raptors (Section 4.4.1). Harassment techniques (e.g., pyrotechnics) generally are not effective in dispersing raptors from airports and killing raptors on airports to reduce strikes is generally not a recommended action because of their protected status and beneficial attributes (except when on airports). Relocation has also been attempted for more abundant species such as waterfowl (Cooper 1991, York et al 2001). In some of the waterfowl relocation programs, the project goals have included releasing the birds in sites where they are available for hunter harvest. In these programs, the increased mortality in relocated birds, including hunter harvest, likely plays an important role in the general efficacy of this method (Smith 1996, Cooper and Keefe 1997).

1 With proper use and follow-up, AC reduces the potential for stress, injury and death in many situations over other capture techniques.

Smith (1996) reported that groups of juvenile geese relocated from urban to rural settings can effectively eliminate these geese from urban areas, retain them at the release site, include them in the sport harvest, and expose them to higher mortality. Smith (1996) also reported that multiple survival models indicated that survival estimates of relocated juveniles were half of those of urban captured and released birds. Hall and Groninger (2002) reported mortality rates of 19% for translocated geese in New Mexico (17.6% attributed to hunting). Mortality rates for geese captured and released on site instead of relocated were 14.2% (9.8% attributed to hunting). Woytek and Hestbeck (1997) reported that relocated goslings had higher recovery rates, lower survival and high fidelity to relocation areas in Minnesota than normal wild goslings. Ultimately, the relocation of resident waterfowl from metropolitan communities can assist in the reduction of overabundant populations (Cooper and Keefe 1997), and has been accepted by the general public as a method of reducing waterfowl populations to socially acceptable levels (Fairaizl 1992).

States like Minnesota and Michigan have used or are using programs which round-up urban waterfowl and give them to farms where the birds spend the rest of their lives. These programs have proven to be expensive for the state and have encountered difficulties with the sites which accept birds running out of room for new birds. Although individuals opposed to the use of lethal techniques may prefer this alternative, there are some people who feel that committing a wild bird to life in captivity is also inappropriate.

Despite some successes with Canada Geese and raptors, relocation programs face numerous challenges. The method may not be cost effective for abundant species. Many problem bird species are highly mobile and can easily return to damage sites from long distances. Habitats in other areas may already be occupied, and relocation may result in bird damage problems at the new location. Additionally, few areas are likely to accept non-native species such as Rock Pigeons, House Sparrows, Mute Swans, domestic ducks and European Starlings. Relocation of resident birds, especially resident waterfowl has the potential to spread disease into populations of other resident birds and/or migrating waterfowl. The American Association of Wildlife Veterinarians, "...discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control." (AAWV undated). Translocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of concerns pertaining to disease transmission, stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats, and the ability of some species to return to their original site.

LETHAL METHODS

Egg Addling/Oiling /Destruction: These techniques involve destroying the embryo prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen. The advantage of egg addling and egg oiling is that adult birds may continue to incubate the eggs even though they are not viable. This delay helps reduce the likelihood that the adults will re-nest.

Shooting with shotguns, air rifles, or rim and center-fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. All firearm safety precautions are followed by WS when conducting bird damage management activities, and laws and regulations governing the lawful use of firearms are strictly complied with. Shooting is a very individual specific method and is normally used to remove a single offending bird, or group of birds numbering less than 50 at one location. Shooting is more effective as a dispersal technique than as a way to reduce bird densities when a large number of birds are present. Shooting a few birds could be shot from a flock may be used to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997 Revised). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Non-toxic shot will be used to harass or take migratory birds at all times; however lead shot may be used to harass or take non-migratory bird species in non-wetland/riparian areas.

Firearm use is very sensitive issue and a public concern because of concerns relating to the misuse of firearms. To ensure safe firearms use and safety awareness, WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 2 years afterwards (WS Directive 2.615). WS employees, who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

DRC-1339, 3-chloro-4-methylbenenamine hydrochloride, is commonly used by ID WS (up to 100 applications annually) for management of various avian species. DRC-1339 is an avian toxicant registered with the Environmental Protection Agency (EPA) and by the Idaho State Department of Agriculture (ISDA). For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, crow, raven, magpie, and pigeon damage management (West et al. 1967, Besser et al. 1967, and Decino et al. 1966). It is a slow acting avicide that is rapidly metabolized and excreted after ingestion. Because of its rapid metabolism, DRC-1339 poses a discountable risk of secondary poisoning to non-target animals, including avian scavengers (Cunningham et al. 1979, Schafer 1984, Knittle et al. 1990). This compound is also unique because of its relatively high toxicity to most pest birds but low-to-moderate toxicity to most raptors and almost no toxicity to mammals (DeCino et al. 1966, Schafer 1991). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/ bird to cause death (Royall et al. 1967); many other bird species such as raptors, sparrows, and eagles are classified as non-sensitive (USDA 1997 revised Pages P194-P210). Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and Threatened or Endangered (T/E) species (USDA 1997 revised Pages P194-P210). Secondary poisoning has not been observed with DRC-1339 treated baits. During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1979). This can be attributed to relatively low toxicity to species that might scavenge on birds killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, ultra violet radiation or water and is highly soluble in water but does not hydrolyze.

DRC-1339 tightly binds to soil and has low mobility. The half-life is approximately 25 hours, which means it is nearly 100% broken down within a week. Identified metabolites (*i.e.*, degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997 revised Pages P194-P210). The EPA label prohibits using DRC-1339 baits directly in water or areas where runoff is likely.

Prior to the application of DRC-1339, pre-baiting is required to monitor for non-target species that may potentially consume treated baits, reducing potential exposure to non-target species. If non-target species are observed feeding on pre-bait, ID WS would postpone use of DRC-1339, terminate the proposed project until non-targets discontinue feeding at the site, change bait types to reduce its attractiveness to non-targets or select an alternative site. EPA labels for DRC-1339 prohibit use of the product in areas where potential consumption of treated baits by T/E species could occur. Baits may be in various forms, but the most common uses by ID WS are grains and cull French fries in feedlot/dairy applications and meat bait and boiled eggs for livestock depredation situations. DRC-1339 is typically used on both public and private lands in urban and rural areas for lethal control of starlings, blackbirds, pigeons, magpies, ravens and crows.

Avitrol is an avicide used as a damage management tool for house sparrows, blackbirds (red-winged, yellow-headed, and Brewer's blackbirds, grackles, cowbirds, European starlings), rock pigeons and crows. Avitrol® is a restricted-use pesticide that can only be sold to certified applicators, and is available in several bait formulations. Treated bait is mixed with untreated material to form a final bait formulation where only a small portion of the individual grains carry the chemical. For most species, dilution rates lower than a 1 to 9 ratio are not recommended or needed. For example, one of the formulations for use in pigeons notes that dilution rates of 1 to 29 can be effective in most situations (EPA Reg. No. 11649-7). For house sparrows, lower dilution rates such as 1 to 5 may be needed for particularly difficult problems (EPA Reg. No. 11649-6). The active ingredient (4-aminopyridine) acts on the central nervous systems and motor nervous systems. Birds display abnormal flying behavior after ingesting treated baits, become disoriented and emit distress vocalization (Roswell 1979, EPA 2007). There is variation among species in response to the product (e.g., pigeons generally do not vocalize) and in response to treated birds. Some species such as blackbirds appear to be highly responsive but others such as house sparrow and rock pigeons are less responsive (EPA 2007). In a study by Roswell et al. (1979), treated birds displayed depressive and dissociative anesthetic electro-encphalographic changes during course of action. These changes would appear to indicate that although the treated birds are behaving abnormally, they are not in pain. Behavior by treated birds usually deters the remaining birds from the site (EPA 2007). Birds that consume treated baits normally die.

An EPA Ecological Risks Assessment for avitrol (EPA 2007) identified the following potential ecological risks from avitrol use: risk of environmental contamination and local impacts on plants from avitrol which may be washed of bait during rain events, risks to animals which may drink water which has accumulated in avitrol bait stations during rainfall events, risks of direct consumption of avitrol by non-target species, and secondary hazards to predators which may consume animals which have eaten avitrol. The EPA evaluation was conducted using application as directed by the label and does not take into account additional precautions used by Idaho WS to reduce potential risks from the use of this product. Risks associated with use of avitrol broadcast on the ground and avitrol exposure to rainfall are eliminated because WS uses bait stations to administer avitrol. Wildlife Services personnel

remain on site during avitrol application and will not apply bait when it could be rained on unless the bait station is placed in a location where the bait will not be exposed to rainfall. Any bait left after a treatment will be disposed of in accordance with label directions. Current label requirements stipulate that the product must not be applied were non-target birds are feeding and that careful observations of the birds' feeding habits must be made to establish proper feeding locations and to determine that no non-target birds are feeding on pre-bait. In addition to pre-baiting, WS' use of bait stations and harassment of non-target species which may approach during bait application prevents risks of non-target species directly consuming treated bait. Consequently potential risks of primary toxicity, water contamination and plant exposure to avitrol from WS' use of this product are negligible. There are three likely routes by which a predator or scavenger could be exposed to avitrol treated birds; through consumption of birds behaving erratically because they have consumed a toxic dose of avitrol, consumption of carcasses of birds killed with avitrol, and consumption of birds which had consumed a sub-lethal dose of avitrol. The EPA report discusses potential secondary hazards to predatory animals and references Ecological Incident Information System (EIIS) records of four predatory bird deaths, including one Peregrine Falcon (*Falco peregrinus*), that were determined to be due to ingestion of poisoned birds (EPA 2007). In other states, WS has also received comments regarding a hypothesis that exposure to sub-lethal doses of avitrol may cause disorientation and contribute to building collision deaths of raptors in urban areas. In a study by Schafer et al. 1974, no effects were observed in predatory and scavenging species fed avitrol-treated blackbirds, but no information was available on the amount of avitrol in the blackbirds. The dose required to kill a blackbird is lower than for more resistant bird species such as pigeons. The EPA report noted that it would be possible for birds in the wild to consume more avitrol than the birds were fed in the laboratory studies. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning. However, in a field study, magpies and crows may have been affected secondarily (Schafer 1991). A laboratory study showed, though, that magpies which fed on birds killed with two to 3.2 times the lethal dose of active ingredient for 20 days were not affected (Schafer et al. 1974). As noted above, the EPA report considered risks from avitrol in light of label requirements not Idaho WS procedures to reduce risks. Risk of raptors catching and consuming birds behaving erratically because of avitrol poisoning is minimized by the presence of WS personnel at the treatment site who can harass any non-target birds, including raptors, which may approach the treatment area. WS patrols the area around the treatment site and collects and properly disposes of carcasses of birds killed with avitrol. Data from Schafer et al. (1991) indicate that avitrol is non-accumulative in tissues and rapidly metabolized by many species. Chronic toxicity has not been demonstrated (Schafer 1991). It is difficult to know the circumstances surrounding the mortality of the raptor species noted in the EIS. However it should be noted that most avitrol use is by private contractors who, while they may comply with label directions, may not employ the extra protective measures used by WS. Although mortality of individual non-target birds has occurred and is regrettable, to date, there has been no evidence of major non-target kills or adverse impacts on non-target species populations.

Avitrol® is water soluble and EPA expects the product to be both mobile and persistent in the open environment (EPA 2007). However, use of bait stations, the fact that WS will not use the product when it is raining, and adherence to label requirements for collections and proper disposal of unconsumed bait should prevent environmental contamination. Laboratory studies demonstrated that Avitrol® is strongly absorbed onto soil colloids and has moderately low mobility (USDA 1997 revised P184-185). Avitrol is expected to be stable under

anaerobic conditions. Aerobic biodegradation is expected to be slow in soil and water, with a half-life ranging from 3 to 32 months (EPA 2007).

Snap Traps: Wooden based rat snap traps can be effective in killing offending birds, usually woodpeckers. The trap is nailed to the building with the trigger pointed downward alongside the area of the building sustaining the damage. The trap is baited with nut meats (walnuts, almonds, or pecans) or suet. If multiple areas are being damaged several traps can be used.

Carbon Dioxide (CO_2) Gas is a colorless, odorless, noncombustible gas approved by the AVMA as a euthanasia method (Beaver et al. 2001). CO_2 is a common euthanasia agent apparently because of its ease of use, safety, and ability to euthanize many animals in a short time span. The advantages for using CO_2 are: 1) the rapid depressant, analgesic, and anesthetic effects of CO_2 are well established, 2) CO_2 is readily available and can be purchased in compressed gas cylinders, 3) CO_2 is inexpensive, nonflammable, non-explosive, and poses minimal hazard to personnel when used with properly designed equipment, and 4) CO_2 does not result in accumulation of tissue residues. Carbon dioxide has been used to euthanatize mice, rats, guinea pigs, chickens, and rabbits, and to render swine unconscious before humane slaughter. Studies of 1-day-old chickens have revealed that CO_2 is an effective euthanatizing agent. Inhalation of CO_2 caused little distress to the birds, suppresses nervous activity, and induced death within 5 minutes. In addition, inhalation of CO_2 at a concentration of 7.5% increases the pain threshold, and higher concentrations of CO_2 have a rapid anesthetic effect.

Wildlife Services sometimes uses CO_2 to euthanize birds which have been captured in live traps, by hand, or by chemical immobilization and when relocation is not feasible. Live birds are placed in a container or chamber and CO_2 gas from a cylinder is released into the chamber. The birds quickly expire after inhaling the gas.

Cervical Dislocation is a method used to euthanize birds after they have been captured by other means. The bird is grasped by the legs and the neck is stretched by pulling on the head while applying a ventro-dorsal rotational force to the skull (AVMA 2013). The American Veterinary Medical Association considers this technique appropriate for birds under 3 kg.

Hunting

Wildlife Services sometimes recommends that resource owners consider legal hunting as an option for reducing game bird species damage. Although legal hunting is impractical and/or prohibited in many urban/suburban areas, it can be used to reduce some local populations of game birds. Legal hunting also reinforces harassment programs (Kadlec 1968).

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Ohio Department of Natural Resources

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April 22, 2013

Andrew J. Montoney
State Director, Ohio Program
USDA, APHIS, Wildlife Services
6929 Americana Parkway
Reynoldsburg, Ohio 43068-4116

Dear Director Montoney:

This is in response to your March 26th request for consultation from the ODNR Division of Wildlife for the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (USDA APHIS WS) proposed bird management program regarding potential impacts to state-listed avian species. Having reviewed the Proposed Actions, the Division of Wildlife believes that USDA APHIS WS has adequately evaluated the effects on state-listed species and will utilize the best available legal nonlethal and lethal methods deemed practical and effective for the damage situation. While it may not always be practical, employing nonlethal methods would be preferred when addressing situations involving state endangered or threatened avian species. If a specific damage management action is likely to directly and adversely impact a state endangered or threatened species, Division staff should be consulted to discuss the situation.

Adverse impacts to state endangered or threatened avian populations by USDA APHIS WS should be minimal or not likely to occur as a result of the adaptive integrated management approach being proposed. Actions employed by USDA APHIS WS should be conducted in accordance with all applicable state wildlife regulations. Please don't hesitate to contact me, if you have any questions or need further assistance.

Sincerely,

Carolyn Caldwell
Terrestrial Endangered Species & Wildlife Diversity Administrator
Wildlife Management and Research Group
ODNR Division of Wildlife