SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT: STATEWIDE WILDLIFE DAMAGE MANAGEMENT AT AIRPORTS IN MASSACHUSETTS

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

In Cooperation with:

United States Department of Interior
Unites States Fish and Wildlife Service

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I. INTRODUCTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program prepared an environmental assessment (EA) to evaluate potential impacts to the quality of the human environment from the implementation of a management program to address mammalian and avian threats to aviation safety, damage to aircraft and airport property, and threats to human health, safety, and life at airports in Massachusetts (USDA 2002). The EA evaluated the need for damage management and the relative effectiveness of four alternatives to meet that proposed need, while accounting for the potential environmental effects of those activities. WS' proposed action in the EA evaluates an integrated damage management program in the Commonwealth to fully address the need for reducing threats associated with wildlife while minimizing impacts to the human environment.

The EA analyzes the effects of WS' activities to reduce threats to property and human safety at airports and surrounding areas in the Commonwealth associated with bird species and mammal species. Bird species specifically addressed in the EA and this supplement include great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), cattle egret (*Bubulcus ibis*), green heron (*Butorides virescens*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nyctanassa violacea*), turkey vulture (*Cathartes aura*), Canada goose (*Branta canadensis*), snow geese (*Chen caerulescens*), mute swan (*Cygnus olor*), mallard (*Anas platyrhynchos*), other ducks (Family Anatidae, subfamily Anatinae), osprey (*Pandion haliaetus*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Bueto lagopus*), American kestrel (*Falco sparverius*), ring-necked pheasant (*Phasianus colchicus*), ruffed grouse (*Bonasa umbellus*), eastern wild turkey (*Meleagris gallopavo*), Northern bobwhite (*Colinus virginianus*), killdeer (*Charadrius vociferus*), semipalmated sandpipers (*Calidris pusilla*), upland sandpiper (*Bartramia longicaude*), common snipe (*Capella gallinago*), American woodcock (*Philohela minor*), gulls (Family Laridae, subfamily Larinae), terns (Family Laridae, subfamily Sterninae), rock pigeon (*Columba livia*), mourning dove (*Zenaida macroura*), monk parakeet (*Myiopsitta monachus*), great horned owl (*Bubo virginianus*), barred owl (*Strix varia*), snowy owl (*Nyctea scandiaca*), short-eared owl (*Asio flammueus*), chimney swift (*Chaetura pelagica*), belted kingfisher (*Ceryle alcyon*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), Northern flicker (*Colaptes auratus*), blue jay (*Cyabicutta crustata*), American crow (*Corvus brachyrhnchos*), horned lark (*Eremophila alpestris*), tree swallow (*Iridoprocne bicolor*), cliff swallow (*Petrochelidon pyrrhonota*), barn swallow (*Hirundo rustica*), Eastern bluebird (*Sialia sialis*), European starling *(Sturnus vugaris*), snow bunting (*Plectrophenax nivalis*), northern cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoeniceus*), Eastern meadowlark (*Sturnella magna*), common grackles (*Quiscalus quiscula*), brown-headed cowbird (*Molothrus ater*), purple finch (*Carpodacus purpureus*), house finch (*Carpodacus mexicanus*), and house sparrow (*Passer domesticus*). In addition to those avian species specifically addressed, WS could also address threats associated with other avian species but the number of individuals addressed of each of those species would be of low number and are likely to occur infrequently.

Mammal species specifically addressed in the EA and this supplement include white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), Virginia opossum (*Didelphis virginianus*), black bear (*Ursus americanus*), coyote (*Canis latrans*), red fox (*Vulpes fulva*), gray fox (*Urocyon cinereoargenteus*), raccoon *(Procyon lotor*), bobcat (*Lynx rufus*), feral cat (*Felix* sp.), striped skunk (*Mephitis mephitis*), fisher (*Martes pennanti*), short-tailed weasel (*Mustela erminea*), long-tailed weasel (*Mustela frenata*), mink (*Mustela vison*), river otter (*Lutra canadensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), woodchuck (*Marmota monax*), Eastern chipmunk (*Tamias striatus*), Eastern gray squirrel (*Sciurus carolinensis*), red squirrel (*Tamiasciurus hudsonicus*), Southern flying squirrel (*Glaucomys volans*), Northern flying squirrel (*Glaucomys sabrinus*), deer mouse (*Peromyscus maniculatus*) white-

footed mouse (*Peromyscus leucopus*), boreal red-backed vole (*Clethrionomys gapperi*), meadow vole (*Microtus pennsylvanicus*), pine vole (*Pitymys pinetorum*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), house mouse (*Mus musculus*), meadow jumping mouse (*Zapus hudsonius*), woodland jumping mouse (*Napaeozapus insignis*), porcupine (*Erethizon dorsatum*), European hare (*Lepus europaeus*), snowshoe hare (*Lepus americanus*), blacktail jackrabbit (*Lepus californicus*), Eastern cottontail (*Sylvilagus floridanus*), New England cottontail (*Sylvilagus transitionalis*), shrews (*Sorex* sp.), short-tailed shrew (*Blarina brevicauda*), starnose mole (*Condylura cristata*), Eastern mole (*Scalopus aquaticus*), myotis bats (*Myotis* sp.), silver-haired bat (*Lasionycteris noctivagans*), Eastern pipistrel (*Pipistrellus subflavus*), big brown bat (*Eptesicus fuscus*), red bat (*Lasiurus cinereus*), and big brown bat (*Eptesicus fuscus*). In addition to those mammalian species specifically addressed, WS could also address threats associated with other mammal species but the number of individuals addressed of each of those species would be of low number and are likely to occur infrequently.

II. PURPOSE

The purpose of the EA will remain as addressed in section 1.2 of the EA (USDA 2002). This supplement to the EA examines potential environmental impacts of WS' program as it relates to: 1) conducting disease surveillance and monitoring in wildlife populations, 2) new information that has become available from public comments, research findings, and data gathering since the issuance of the Decision and Finding of No Significant Impact (FONSI) in 2002, 3) the analyses of WS' wildlife damage management activities at airports in Massachusetts since the Decision/FONSI was issued in 2002 to ensure program activities are within the impact parameters analyzed in the EA, and 4) includes the United States Fish and Wildlife Service (USFWS) as a cooperating agency on the EA and this proposed supplement to the EA for the purpose of issuing depredation permits associated with those bird species addressed in the EA and this proposed supplement to the EA.

III. NEED FOR ACTION

A description of the need for action to address threats and damages associated with wildlife at airports in the Commonwealth is provided in section 1.3 of the EA (USDA 2002). The need for action addressed in the EA remains applicable to this supplement to the EA. The need for action is based on a need to reduce threats associated with aircraft striking wildlife at airports in the Commonwealth. Aircraft striking wildlife can cause damage to the aircraft which can lead to costly repairs. In addition, wildlife strikes can threaten human safety if strikes cause catastrophic damage to the aircraft leading to crashes.

WS continued to provide both operational and technical assistance to those airports experiencing damage or threats of damage caused by wildlife strikes in the Commonwealth since the Decision and FONSI for the EA were signed in 2002. Technical assistance was provided to airport personnel through the dissemination of handouts and information regarding damage management techniques, species identification, methods demonstrations, loaning of equipment, and site visits. Through technical assistance, WS made recommendations on the appropriate methods available for use that a requestor could employ to resolve damage or reduce threats without WS' direct involvement. Technical assistance as provided by WS to resolve damage or threats associated with wildlife at airports in the Commonwealth under the proposed action was discussed in the EA under Section 3.2.3 (USDA 2002).

Many of the avian species addressed in the EA and this supplement are gregarious (*i.e.*, form large flocks), especially during the fall and spring migration periods. Although damage and threats can occur throughout the year, damage and threats of damage are highest during those periods when birds are concentrated into large flocks such as migration periods and during winter months when food sources are limited. For some bird species, high concentrations of birds can be found during the breeding season where suitable nesting habitat exists, such as swallows and gulls. The flocking behavior of many bird

species during migration periods can pose increased risks when those species occur near or on airport properties. Aircraft striking multiple birds not only increases the chances of causing damage to the aircraft and the amount of damage but also increases the risk that a catastrophic failure of the aircraft might occur, especially if multiple birds are ingested into aircraft engines.

The civil and military aviation communities have acknowledged that the threat to human health and safety from aircraft collisions with wildlife is increasing (Dolbeer 2000, MacKinnon et al. 2001). Collisions between aircraft and wildlife are a concern throughout the world because wildlife strikes threaten passenger safety (Thorpe 1996), result in lost revenue, and repairs to aircraft can be costly (Linnell et al. 1996, Robinson 1996). Aircraft collisions with wildlife can also erode public confidence in the air transport industry as a whole (Conover et al. 1995). The emergency landing of U.S. Airways Flight 1549 in the Hudson River in early 2009 after the aircraft ingested Canada geese into both engines (National Transportation Safety Board 2009, Marra et al. 2009) has increased the public's awareness of the dangers associated with aircraft striking wildlife (Dolbeer et al. 2009). In several instances, wildlife-aircraft collisions in the United States have resulted in human fatalities. Bird strikes cause an estimated seven fatalities involving civilian and military aircraft each year (Linnell et al. 1996). Since 1988, more than 229 people worldwide have died in aircraft that have crashed after striking wildlife (Dolbeer et al. 2009). In 1995, an Air Force E-3B AWACS aircraft collided with a flock of Canada geese at Elmendorf Air Force Base, Alaska, killing all 24 passengers and crew. In addition, a $190 million plane was lost (Dolbeer 1997). A recent example occurred in Oklahoma where an aircraft struck American white pelicans (*Pelecanus erythrorhynchos*) causing the plane to crash killing all five people aboard (Dove et al. 2009). The risk that birds pose to aircraft is well documented with the worst case reported in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of European starlings (Terres 1980).

From January 1990 through December 2009, 1,590 wildlife strikes were reported to the Federal Aviation Administration (FAA) in Massachusetts (FAA 2010). Reporting of wildlife strikes is not mandatory and it is estimated that less than 20% of aircraft strikes are reported (Cleary et al. 2005, Wright and Dolbeer 2005). From 1990 to 2008, 89,727 wildlife strikes have been reported to the FAA. Birds were involved with nearly 97% of those reported strikes to civil aircraft in the United States (Dolbeer et al. 2009). This number is likely to be much greater since an estimated 80% of civil bird strikes go unreported (Cleary et al. 2005, Wright and Dolbeer 2005). In Massachusetts, nearly 98% of the reported aircraft strikes with wildlife have involved birds (Dolbeer et al. 2009). Generally, bird collisions occur when aircraft are near the ground during take-off and approach to the runway. From 1990 through 2008, approximately 60% of reported bird strikes to United States civil aviation occurred when the aircraft was at an altitude of 100 feet above ground level or less. Additionally, 72% occurred less than 500 feet above ground level and approximately 92% occurred under 3,000 feet above ground level (Dolbeer et al. 2009).

Waterfowl were involved in the greatest number of damaging strikes (31%) in which the bird species was identified when compared to all other bird groups (Dolbeer et al. 2009). Nationally, the resident Canada goose population probably represents the single most serious bird threat to aircraft safety (Alge 1999, Seubert and Dolbeer 2004, Dolbeer and Seubert 2006). Resident Canada geese are of particular concern to aviation because of their large size (typically 8-15 lbs which exceeds the 4-lb bird certification standard for engines and airframes); flocking behavior (which increases the likelihood of multiple bird strikes); attraction to airports for grazing; and year-around presence in urban environments near airports (Seubert and Dolbeer 2004). From 1990 through 2008, there were 1,181 reported strikes involving Canada geese in the United States, resulting in nearly $51 million in damages and associated costs to civil aircraft (Dolbeer et al. 2009). Dolbeer et al. (2009) reported that gulls were the most commonly struck bird group from 1990 through 2008. Gull strikes represent over 18% of all reported wildlife strikes in Massachusetts. The USAF reports that herring gulls, ring-billed gulls, and laughing gulls have been identified in 593 military aircraft strikes across the United States resulting in nearly $8.7 million in

damages to aircraft (USAF 2009). Vultures are considered to be 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).

Mammal species can also pose risks to property and human safety at airports. Approximately 56% of the reported aircraft strikes involving terrestrial mammals occur from July through November with most strikes occurring at night (Dolbeer et al. 2009). Aircraft strikes involving terrestrial mammals occur primarily during the landing roll of the aircraft and takeoff run (Dolbeer et al. 2009). More aircraft strikes involving mammals result in damage being reported to aircraft when compared to bird strikes. Approximately 59% of the aircraft strikes involving mammal species resulted in damage to the aircraft compared to 14% of bird strikes reporting damage to the aircraft (Dolbeer et al. 2009). Deer have been involved in 41% of the reported terrestrial mammal strikes in the United States (Dolbeer et al. 2009).

Airports provide ideal conditions for feeding and bedding sites for deer due to the large grassy areas adjacent to brushy, forested habitat often used as noise barriers. Deer living within airport boundaries are usually protected from hunting and many other human disturbances. Deer-aircraft strikes can result in loss of human life, injury to passengers or people on the ground, and damage or malfunction of aircraft, aircraft navigational aids, or airport facilities. Aircraft colliding with mammals during the most vulnerable phases of flight (*i.e.*, takeoff or landing) can cause the aircraft to crash or sustain physical damage. Mammals are characteristically unpredictable in their initial response to approaching aircraft. Deer may wander onto runway surfaces and be startled into the path of oncoming aircraft, and at night, they may freeze when caught in the beams of landing lights, resulting in a strike. The majority of deer-aircraft strikes occur at night and in the fall during the breeding season (Dolbeer et al. 2009).

White-tailed deer are a commonly encountered problem at airfields in Massachusetts, threatening the safe operation of aircraft at those facilities. Collisions between deer and aircraft can cause major damage to the aircraft, and potentially cause injury and loss of human life. Serious consequences are also possible if pilots lose control of the aircraft while attempting to avert a collision with deer. From 1990 through 2008, there were 745 reported deer-aircraft strikes to civil aircraft in the United States resulting in 195,663 hours in aircraft down time and nearly $29 million in reported repair costs (Dolbeer et al. 2009).

Other mammal species can also pose threats to aircraft or act as attractants for other wildlife species that then pose a threat to aviation safety. Of reported strikes, coyotes were involved with 34% of the strikes involving terrestrial mammals which are the second highest percentage for mammals behind only deer. A total of 33 species of terrestrial mammals have been identified in the strike record in the United States along with eight species of bats (Dolbeer et al. 2009). Between species of carnivores and species of Artiodactyls (*i.e.*, hooved, even-toed mammals), nearly $39 million in damages to aircraft have occurred from 1990 through 2008 in the United States (Dolbeer et al. 2009).

From January 1990 through December 2008, a total of 100 aircraft strikes have been reported in the United States that involved reptiles. Although reptiles are struck infrequently at airports and do not necessarily pose direct threats to aircraft, reptiles can act as attractants for mammal and bird species that then pose threats to aircraft. For example, the presence of a snake sunning on a runway can attract raptors which routinely feed on snakes. The present of the raptor near the runway could pose a threat of an aircraft strike.

Since the completion of the EA, the USFWS has prepared a Final Environmental Impact Statement (FEIS) to address damage associated with an increasing population of double-crested cormorants in the United States. The increasing population of cormorants has lead to damage and threats of damage to agricultural resources, natural resources, property, and human safety (USFWS 2003). Additional information on cormorant populations and damage threats can be found in the double-crested cormorant

management FEIS prepared by the USFWS (USFWS 2003). In addition, the USFWS has also developed an FEIS to manage increasing populations of resident Canada geese to alleviate damage and threats of damage (USFWS 2005).

Disease Surveillance and Monitoring

Public awareness and health risks associated with avian zoonoses have increased in recent years. One of the first avian zoonoses to gain public attention was the West Nile Virus (WNV) with outbreaks of the virus first reported in the United States in 1999. Today, WNV has been documented to occur in all 48 conterminous States. In 2008, the Centers for Disease Control and Prevention (CDC) reported 1,356 documented cases of WNV infections in humans in 45 States with 44 deaths (CDC 2009*a*). WS continues to provide technical assistance to those individuals requesting information on WNV and provides information on current WNV monitoring activities. The WS program in Massachusetts is not currently actively collecting samples for WNV in the Commonwealth. If a large outbreak of WNV is detected in Massachusetts, WS as part of an interagency team would likely begin collecting samples from avian species as part of a disease monitoring program.

Another disease threat gaining public awareness is the high pathogenic H5N1 avian influenza (AI) virus. AI is an influenza virus naturally occurring in birds worldwide. Many subtypes of type A influenza virus are known with subtypes differing between types of hemagglutinin (HA) and neuraminidase (NA) proteins on the surface of the influenza virus (CDC 2009*b*). The CDC (2009*b*) reports 16 known HA protein subtypes and nine known NA protein subtypes of the influenza A virus resulting in numerous possible combinations of proteins with each combination resulting in a different subtype. Birds are known to carry all known subtypes of the influenza A virus; however, most subtypes of influenza A virus do not cause illness in birds (CDC 2009*b*). Despite a lack of clinical illness in most bird species from AI infections, AI is very contagious among birds and can cause severe illness and death in domestic birds, such as chickens, waterfowl, and turkeys (CDC 2009*b*).

Birds infected with AI shed the virus in saliva, nasal secretions, and feces. Infection can occur from direct contact with the bodily fluids of infected birds or from surfaces contaminated with bodily fluids of infected birds (CDC 2009*b*). There are two main forms of AI infections in domestic poultry and waterfowl that are distinguished based on a high and low virulence rate. Low pathogenic AI typically goes undetected in bird species with birds showing mild symptoms, such as ruffled feathers or a reduction in egg production. High pathogenic AI is highly virulent and can spread rapidly in domestic poultry and waterfowl and can cause high mortality rates, often within 48 hours of infection (CDC 2009*b*).

AI refers to influenza virus infections that are found primarily in birds; however, the main concern with the AI virus is that human infections are known to occur (CDC 2009*b*). The risk of human infection from AI viruses is low since most AI virus subtypes do not usually infect humans. However, the CDC (2009*b*) reports that since 1997 the infection of humans with several subtypes of AI have been documented to occur. Human contraction of AI occurs mainly from contact with infected poultry and waterfowl or from contact with contaminated surfaces. Transmission of AI viruses from human to human is thought to rarely occur.

There are three subtypes of influenza viruses that are currently known to be circulating in the human population that are generically termed human influenza viruses. These three subtypes are H1N1, H1N2, and H3N2 influenza viruses. Current information indicates that those three subtypes of influenza virus commonly infecting humans likely originated from birds based on the genetic similarities of the human and avian influenza subtypes. The primary concern of influenza viruses is that selection processes are constantly changing the virus and that those changes may lead to an adaptation of AI viruses into highly contagious zoonoses (CDC 2009*b*).

The AI virus subtype of most concern in the high pathogenic H5N1 virus that occurs primarily in birds and is highly contagious with a high mortality rate in certain avian species. The CDC (2009*b*) reports that of the AI subtypes that are known to occasionally infect humans; the H5N1 subtype has accounted for the greatest number of detected cases in humans and caused the most severe symptoms along with the most deaths. However, the severity of symptoms and the high number of deaths attributed to H5N1 increases the likelihood of reporting of the subtype compared to the milder symptoms of other AI viruses that are likely to go undiagnosed or unreported (CDC 2009*b*). Since 1997, reported human cases of H5N1 infections associated with outbreaks of the virus in poultry and waterfowl have occurred in Asia, parts of Europe, and Africa with more than half the reported human cases of high pathogenic H5N1 resulting in death (CDC 2009*b*). As stated previously, human to human transmission has been documented to occur rarely with most human infections occurring from direct contact with infected birds or from contact with surfaces contaminated by infectious birds. Despite the current inefficiency of transmission from human to human, the ability of the virus to change from external pressures has raised the concern that the highly virulent H5N1 virus could change to a form that readily infects humans with a high likelihood of human to human transmission (CDC 2009*b*). Since AI subtypes do not readily infect humans, an immune response to the AI subtypes does not currently exist in the majority of the human population. If the high pathogenic H5N1 virus gains the ability to readily be transmitted from human to human, the lack of immune protection in humans could lead to a pandemic that could result in a large number of deaths (CDC 2009*b*).

Numerous potential routes for introduction of the virus into the United States exists including illegal movement of domestic or wild birds, contaminated products, and the migration of infected wild birds. Given the occurrence of high pathogenic H5N1 AI in wild birds, there is concern that migrating birds would introduce the virus into new regions of the world, including North America. Many bird species that nest in Arctic Siberia, Alaska, and Canada follow migratory flyways southward to wintering areas in the United States, Central America, and South America. Birds from both Eastern Siberia and Alaska intermingle in several of the established flyways. The overlap at the northern ends of those flyways establishes a geographic location for potential disease transmission across continents and for mixing, change, and exchange of genetic material among strains from Eurasia and North America. If high pathogenic H5N1 AI virus spreads to North America by migratory birds, the virus would most likely arrive first in Alaska and spread south through the flyways by this route (USDA 2005).

Therefore, at the request of the Homeland Security Council's Policy Coordinating Committee for Pandemic Influenza Preparedness, the USDA and the United States Department of Interior (DOI) were requested to develop and coordinate a National Strategic Plan (USDA 2005) for early detection of high pathogenic H5N1 AI into North America by wild birds. The nationwide surveillance effort has detected some instances of low pathogenic AI viruses, as was expected given that waterfowl and shorebirds are considered to be the natural reservoirs for AI. Tens of thousands of birds have been tested, but there has been no evidence of the high pathogenic H5N1 virus in North America.

The WS program in Massachusetts is also involved in monitoring and managing zoonotic diseases in mammals. WS maintains an active rabies monitoring and oral vaccination program across Barnstable County in the Commonwealth. Monitoring projects are also in place to detect tularemia in carnivores and aquatic mammals along with chronic wasting disease and tick borne diseases such as Lyme disease and ehrlichiosis.

WS would continue to work as part of an interagency team in conducting surveillance for AI and WNV in bird species. Based on WS' participation in conducting disease surveillance and monitoring as part of an interdisciplinary team, WS' anticipates a need to continue efforts to monitor and detect the presence of avian zoonoses to determine threats and risks to human health and safety. This supplement to the EA will

address WS' avian and mammalian disease monitoring and surveillance activities, as related to sample collecting under surveillance and monitoring activities. Other communicable diseases addressed in section 1.3.2 of the EA will remain as addressed (USDA 2002).

IV. CURRENT AND PROJECTED WORK

There are currently 246 aviation facilities registered with the FAA in Massachusetts. There are 100 airports, 145 heliports, and one balloon port. Nine of those airports are certificated under FAR Part 139[1]. One is owned and operated by the United States Air Force Reserve, which is collocated with one of the certificated airports. Another airport is owned and operated by the United States Coast Guard which also owns a heliport. One of the certificated airports is host to an Air National Guard fighter wing.

WS has full time wildlife biologist positions at two airports in Massachusetts. Currently, WS is conducting Wildlife Hazard Assessments at three airports in the Commonwealth. Wildlife Hazard Assessments are comprehensive surveys conducted at airports to assess and identify aircraft strike risks associated with wildlife. The Wildlife Hazard Assessments are then used by the air facilities to prepare a Wildlife Hazard Plan that documents the strategy for addressing those risks of aircraft strikes associated with wildlife identified in the Assessment. WS conducts operational management projects at Untied States Coast Guard and Air National Guard facilities within the Commonwealth. Additional operational control projects are conducted as requested at other airports throughout the Commonwealth.

Additional Wildlife Hazard Assessments are currently anticipated for certificated airports in Massachusetts. Additional operational control projects may be conducted at or adjacent to aviation facilities if assistance is requested.

V. RELATIONSHIP OF THIS DOCUMENT TO OTHER ENVIRONMENTAL DOCUMENTS

WS' Programmatic Final Environmental Impact Statement: WS has developed a programmatic Final Environmental Impact Statement (FEIS) that addresses the need for wildlife damage management in the United States (USDA 1997). The FEIS contains detailed discussions of potential impacts to the human environment from wildlife damage management methods used by WS. Pertinent information available in the FEIS has been incorporated by reference into the EA and this supplement to the EA.

Resident Canada Goose Management Final Environmental Impact Statement: The USFWS has issued a FEIS addressing the need for and potential environmental impacts associated with resident goose damage management activities (USFWS 2005). The FEIS also contains detailed analyses of the issues and methods used to manage Canada goose damage. A Record of Decision (ROD) and Final Rule were published by the USFWS on August 10, 2006 (71 FR 45964-45993). On June 27, 2007, WS, as a cooperating agency, issued a Record of Decision and adopted the USFWS FEIS (72 FR 35217).

Light Goose Management Final Environmental Impact Statement: The USFWS has also prepared a FEIS to address the management of snow geese and Ross's geese (USFWS 2007). The preferred alternative in the FEIS modified existing regulations to allow additional hunting methods to harvest snow geese and Ross's geese within the current migratory bird hunting season frameworks. The preferred alternative also created a conservation order for the management of overabundant snow goose populations (50 CFR 21.60).

Double-crested Cormorant Management in the United States Final Environmental Impact Statement: The USFWS has issued a FEIS on the management of double-crested cormorants (USFWS 2003). WS

[1]Information on FAR Part 139 can be found at http://www.faa.gov/airports/airport_safety/part139_cert/.

was a formal cooperating agency in the preparation of the FEIS and has adopted the FEIS to support WS' program decisions for its involvement in the management of cormorant damage. WS completed a ROD on November 18, 2003 (68 FR 68020). Pertinent and current information available in the FEIS has been incorporated by reference into this document.

Extended Management of Double-crested Cormorants under 50 CFR 21.47 and 21.48 Final Environmental Assessment: The FEIS developed by the USFWS in cooperation with WS established a Public Resource Depredation Order (PRDO; 50 CFR 21.48) and made changes to the 1998 Aquaculture Depredation Order (AQDO; 50 CFR 21.47). To allow for an adaptive evaluation of activities conducted under the PRDO and the AQDO established by the FEIS, those Orders would have expired on April 30, 2009 (USFWS 2003). The EA determined that a five-year extension of the expiration date of the PRDO and the AQDO would not threaten cormorant populations and activities conducted under those Orders would not have a significant impact on the human environment (74 FR 15394-15398; USFWS 2009).

Environmental Assessment - Reducing Rock Dove (Feral Pigeon), European Starling, and House Sparrow Damage through an Integrated Wildlife Damage Management Program in the Commonwealth of Massachusetts: WS has developed an EA that addresses the need for rock pigeon, European starling, and house sparrow damage management in the Commonwealth (USDA 2007). The statewide pigeon, starling, and sparrow EA contains detailed discussions of potential impacts to the human environment from pigeon, starling, and sparrow damage management methods used by WS. Pertinent information available in the statewide pigeon, starling, and sparrow EA has been incorporated by reference into the EA and this Decision.

Environmental Assessment – Reducing Gull Damage in the Commonwealth of Massachusetts: The EA was developed to evaluate potential impacts to the human environment from conducting gull damage management activities when requests for assistance are received by WS in the Commonwealth (USDA 2010). The EA evaluated alternative strategies and issues associated with managing damage associated with herring gulls, great black-backed gulls, ring-billed gulls, and laughing gulls. The EA evaluated the cumulative activities to address damage and threats of damage at airports as well as requests for assistance to manage damage to agricultural resources, natural resources, property, and threats to human safety.

VI. OBJECTIVES FOR WILDLIFE DAMAGE MANAGEMENT AT AIRPORTS

The EA identified three objectives for wildlife damage management conducted by WS at airports in the Commonwealth (see section 1.6 of the EA). Those objectives were (1) to reduce damaging wildlife strikes to less than five strikes per year per airport, (2) reduce and maintain wildlife use in hangers to less than $1,000 dollars in damage per year per airport, and (3) to maintain the runways and airfields to no down time caused by wildlife.

To measure the results of the first objective, WS has monitored the FAA National Wildlife Strike Database to determine the number of damaging strikes that occurred at airports during operational management projects (FAA 2010). When analyzing aircraft strikes, the goal of five or fewer damaging strikes was achieved at all airports where WS provided assistance during all years except FY 2004 and FY 2005 when nine and eight damaging strikes were reported at one large metropolitan airport, respectively.

WS received limited requests for assistance in managing damage to hangars and responded to all requests for assistance when conducting operational management projects. No reports of damage figures greater than $1,000 per year per airport were received by WS during the period 2002 to 2009 at airports where WS was conducting operational management projects. This objective was achieved.

No reports of runways or airfields being closed down due to wildlife were reported at Massachusetts airports during periods when WS was conducting operational management projects during the period 2002 to 2009. This objective was achieved.

VII. DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS was the lead agency for the EA, and therefore, responsible for the scope, content, and decisions made. Management of migratory birds is the responsibility of the USFWS under the Migratory Bird Treaty Act (MBTA). The Massachusetts Division of Fisheries and Wildlife (MDFW), under the Massachusetts Department of Fish and Game (MDFG), has shared responsibility for managing migratory birds within the Commonwealth. Although the MDFW cannot authorize take of migratory birds in excess of what is authorized by the USFWS, the MDFW can and often does provide additional limits by prohibiting or restricting take below the level authorized by the USFWS. As the authorities for the management of bird populations in the Commonwealth, the USFWS and MDFW have been involved in the development of this supplement to the EA. The USFWS and the MDFW have provided input throughout the preparation process to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The MDFW is responsible for managing wildlife in Massachusetts, including the establishment and enforcement of regulated hunting seasons in the Commonwealth. For migratory birds, the MDFW can establish hunting seasons for those species under frameworks determined by the USFWS. In Massachusetts, depredation permits issued by the USFWS for the take of migratory birds are submitted to the MDFW for review and co-signature before issuance. MDFW has accepted responsibility for issuing permits for the treatment of Canada goose eggs and nests under authority provided by the Resident Canada Goose Management FEIS developed by the USFWS (USFWS 2005).

The MDFW has management authority over mammals, non-migratory birds, and reptiles and establishes hunting and trapping seasons. Additionally, MDFW can issue depredation permits to control species under their management authority causing threats to aviation safety such as white-tailed deer, coyote, red fox, and wild turkey. Moose may not be hunted in Massachusetts but special authorization to take moose that have accessed airfields may be provided by the MDFW or the Massachusetts Environmental Police if they have accessed an airfield and if non-lethal removal is not a viable option.

Authority to issue 10-day permits to take beaver and muskrat causing damage outside the regulated trapping season is delegated to municipal boards of health or the Massachusetts Department of Public Health. Those permits allow for the use of cage traps, suitcase traps, and body gripping traps. If those permits are insufficient to manage damage associated with beaver or muskrat, the MDFW must be consulted and may then issue additional trapping permits. Permits to alter or remove beaver dams or install flow control devices are issued by municipal conservation commissions.

WS' activities to reduce and/or prevent wildlife damage in the Commonwealth would be coordinated with the USFWS and the MDFW which ensures WS' actions are incorporated into population objectives established by those agencies for wildlife populations in the Commonwealth.

Based on the scope of the EA and this supplement to the EA, the decisions to be made are: 1) should WS continue to conduct wildlife damage management to alleviate damage and threats to property and human safety at airports in the Commonwealth, 2) should WS conduct disease surveillance and monitoring in the wildlife population when requested by the MDFW, the USFWS, and other agencies, 3) should WS continue to implement an integrated wildlife damage management strategy, including technical assistance and direct operational assistance, to meet the need for wildlife damage management at airports in the Commonwealth, 4) if not, should WS attempt to implement one of the alternatives to an integrated

damage management strategy as described in the EA, and 5) would continuing the proposed action result in adverse impacts to the environment requiring the preparation of an Environmental Impact Statement (EIS) based on activities conducted since the completion of the EA and/or based on new information available.

VIII. SCOPE OF ANALYSIS

The EA and this supplement to the EA evaluate wildlife damage management activities in the Commonwealth of Massachusetts to reduce damage to property and threats to human safety associated with wildlife at airports in the Commonwealth. The scope of analysis remains valid as addressed in the EA unless otherwise discussed in this supplement.

Actions Analyzed

The EA and this supplement evaluate the need for wildlife damage management to reduce threats to human safety and property at airports within the Commonwealth wherever such management is requested by a cooperator. The EA and this supplement discuss the issues associated with conducting wildlife damage management in the Commonwealth at airports to meet the need for action and evaluate different alternatives to meeting that need while addressing those issues.

WS uses a decision model based on a publication by Slate et al. (1992) which involves evaluating each threat situation, taking action, evaluating the action, and monitoring results of the actions taken. The published article provides more detail on the processes used in WS' Decision Model. WS' programmatic FEIS (USDA 1997) provides more detail and examples of how the model is used. WS' personnel use the Decision Model to develop the most appropriate strategy to reduce damage and to determine potential environmental effects from damage management actions (Slate et al. 1992, USDA 1997, USDA 2002).

Native American Lands and Tribes

Currently, WS does not have a Memorandum of Understanding (MOU) or signed cooperative service agreements with any Native American tribe in Massachusetts. If WS enters into an agreement with a tribe for wildlife damage management at a tribal airport or at an airport on tribal property, the EA would be reviewed and supplemented, if appropriate, to insure compliance with the NEPA.

Period for which the EA is Valid

If the analyses in this supplement indicates an EIS is not warranted, the EA, as supplemented, would remain valid until WS, in consultation with the USFWS and the MDFW, determines that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, the analyses in the EA and this supplement would be reviewed and further supplemented pursuant to the NEPA. Review of the EA and this supplement would occur annually to ensure that the EA is sufficient. This process ensures the EA is complete and still appropriate to the scope of wildlife damage management activities conducted at airports by WS in Massachusetts.

Site Specificity

The EA and this supplement analyzes the potential impacts of wildlife damage management and addresses activities at airports in the Commonwealth currently under a MOU or cooperative service agreement with WS where activities have been and currently are being conducted. The EA and this supplement also addresses the impacts of wildlife damage management at airports and surrounding 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 assistance when requested, within the constraints of available funding and workforce, it is conceivable that additional wildlife damage management efforts could occur at additional airports in the Commonwealth. Thus, the EA and this supplement anticipates the potential expansion of activities to address threats occurring at airports associated with wildlife and analyzes the impacts of such efforts as part of the alternatives.

Planning for the management of wildlife damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual locations and times where they would 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, and insurance companies. Although some of the sites where wildlife damage would occur can be predicted, all specific locations or times where such damage would occur in any given year cannot be predicted. The EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever wildlife damage and the resulting wildlife damage management activities occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992, USDA 1997, USDA 2002) would be the site-specific procedure for individual actions conducted by WS in the Commonwealth.

The analyses in the EA and this supplement are intended to apply to any action that may occur at any airport and at any time within the Commonwealth of Massachusetts. In this way, WS believes it meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish its mission.

Issuance of Depredation Permits by the USFWS to Lethally Take Birds in the Commonwealth

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 at 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 at 50 CFR 13 and 50 CFR 21.

The USFWS will be a cooperating agency during the development of this supplement to the EA to analyze cumulative take of those bird species addressed in the EA and this supplement from the issuance of depredation permits to entities within the Commonwealth. 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 bird damage management activities. The analyses in this supplement to the EA and the analyses in the EA would ensure the USFWS compliance with the NEPA for the issuance of depredation permits for the take of those birds species addressed in the EA and this supplement to the EA.

Public Involvement

The EA was made available to the public for review and comment during a public comment period from March 15, 2002 through April 15, 2002 by a legal notice published on March 13, 2002 and March 14, 2002 in the *Boston Herald*. The EA was also mailed directly to organizations with probable interest in the proposed program. WS received one comment letter during the public involvement process.

Comments from the public involvement process were reviewed for substantive issues and alternatives which were considered in developing the Decision for the EA. WS' responses to comments received were addressed in Appendix A of the Decision for the EA (USDA 2002).

After consideration of the analysis contained in the EA and review of public comments, a Decision and FONSI for the EA was issued on May 17, 2002. The Decision and FONSI selected the proposed action alternative which implemented an integrated damage management program in the Commonwealth using multiple methods to adequately address the need to manage damage caused by wildlife at and adjacent to airports.

This supplement to the EA, along with the EA and the 2002 Decision/FONSI, will be made available for public review and comment through the publication of a legal notice announcing a minimum of a 30-day comment period. The legal notice will be published in the *Boston Herald* and posted on the APHIS website located at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml according to WS' public notification requirements (72 FR 13237-13238). A notice of availability for this supplement to the EA will also be directly mailed to agencies, organizations, and individuals with probable interest in the proposed program. Comments received during the public involvement process will be fully considered for new substantive issues and alternatives.

IX. AUTHORITY AND COMPLIANCE

WS' activities to reduce damage and threats associated with wildlife are regulated by federal, Commonwealth, and local laws and regulations. The authority of WS and other agencies along with the compliance with relevant laws and regulations are discussed in detail in Section 1.9 of the EA (USDA 2002). WS' activities are also conducted consistent with relevant Executive Orders which were also discussed in Section 1.9 of the EA (USDA 2002). Compliance with laws and regulations not directly addressed in the EA will be discussed in this supplement.

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

This law established a voluntary national program within the Department of Commerce to encourage coastal states to develop and implement coastal zone management plans. 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.

Depredation Orders for Canada Geese

As discussed previously, the USFWS developed an EIS to evaluate alternatives to address the increasing resident goose population across the United States and to reduce associated damage (USFWS 2005). In addition, several depredation orders have been established to manage damage associated with Canada geese without a depredation permit from the USFWS when certain criteria are occurring. Under 50 CFR 21.49, resident Canada geese can be lethally taken at airports and military airfields without the need for a depredation permit by airport authorities or their agents when those geese are causing damage or posing a threat of damage to aircraft. A Canada goose nest and egg depredation order has also been established

that allows the nests and eggs of those geese causing or posing a threat to people, property, agricultural crops, and other interests to be destroyed without the need for a depredation permit once the participant has registered with the USFWS (see 50 CFR 21.50). A similar depredation order was established to manage damage to agricultural resources associated with Canada geese. Under 50 CFR 21.51, Canada geese can be lethally taken without a permit from the USFWS in those states designated, including Massachusetts, when geese are causing damage to agricultural resources. Resident Canada geese can be addressed using lethal and non-lethal methods by state agencies, Tribes, and the District of Columbia when those geese pose a direct threat to human health under 50 CFR 21.52. Under the depredation orders for Canada geese, no individual federal depredation permit is required to take geese once the criteria of those orders have been met. Despite the establishment of depredation orders by the USFWS, the MDFW has chosen not to enact those orders; therefore, a bird depredation permit issued by the USFWS and co-signed by the MDFG is still required to lethally take geese in the Commonwealth.

Depredation Order for Double-Crested Cormorants at Aquaculture Facilities (50 CFR §21.47)

The AQDO was established to reduce cormorant depredation of aquacultural stock at private fish farms and state and federal fish hatcheries. Under the AQDO, cormorants can be lethally taken at commercial freshwater aquaculture facilities and state and federal fish hatcheries in 13 States, but does not include Massachusetts. The Order authorizes landowners, operators, and tenants, or their employees/agents, that are actually engaged in the production of aquacultural commodities to lethally take cormorants causing or about to cause damage at those facilities without the need for a depredation permit. Those activities can only occur during daylight hours and only within the boundaries of the aquaculture facility. The AQDO also authorizes WS to take cormorants at roost sites near aquaculture facilities at any time from October through April without the need for a depredation permit with appropriate landowner permissions.

Depredation Order for Double-crested Cormorants to Protect Public Resources (50 CFR §21.48)

The purpose of the PRDO is to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of cormorants to public resources. Public resources, as defined by the PRDO, are natural resources managed and conserved by public agencies. Public resources include fish (free-swimming fish and stocked fish at federal, state, and tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. The Order authorizes WS, state fish and wildlife agencies, and federally-recognized Tribes to conduct damage management activities involving cormorants without the need for a depredation permit from the USFWS in 24 states, which does not include Massachusetts. It authorizes the take of cormorants on "*all lands and freshwaters*" including public and private lands. However, landowner/manager permission must be obtained before cormorant damage management activities may be conducted at any site.

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 lethal take red-winged blackbirds, common grackles, boat-tailed grackles, brown-headed cowbirds, and American crows 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. The rusty blackbird, which may occur in Massachusetts, was removed from the list of species and may no longer be taken under the authority of this depredation order.

Massachusetts Endangered Species Act (M.G.L. c.121A and regulations 321 CMR 10.00)

The Massachusetts Endangered Species Act (MESA) (M.G.L c.131A and regulations 321 CMR 10.00) protects rare species and their habitats by prohibiting the "*take*" of any plant or animal species listed as

endangered, threatened, or of special concern by the MDFW. Take is defined as, "*in references to animals to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of habitat.*" Permits for taking rare species for scientific, educational, conservation, or management purposes can be granted by the MDFW.

Pursuant to the MESA, migratory bird depredation permits issued by the USFWS do not allow for the lethal take of migratory birds listed as threatened or endangered by the Commonwealth of Massachusetts. Additionally, WS does not normally conduct lethal control of species listed by the Commonwealth of Massachusetts as threatened, endangered, or of special concern. If individuals of a listed species are identified as causing a threat to aviation safety, individuals of listed species may be non-lethally harassed. If harassment is insufficient to resolve conflicts, WS would consult with the MDFW for further guidance and assistance with resolving such conflicts with an emphasis on non-lethal means such as live capture and translocation, if feasible. Permits for lethal take may be requested if no other viable options are available. WS also complies with the MESA Project Review and Conservation and Management Permitting requirements when installing water flow control devices to manage beaver flooding.

Massachusetts Environmental Policy Act (MEPA; M.G.L. c.30, secs. 61-62H)

The Massachusetts Environmental Policy Act (MEPA) requires that Commonwealth agencies evaluate the environmental consequences of agency actions, including the issuance of permits and providing financial assistance. The Act also requires Commonwealth agencies incorporate "*...all practicable means and measures to minimize damage to the environment*".

As a federal agency, WS is not directly affected by the MEPA. WS' activities are conducted pursuant to the NEPA. However, activities conducted at airports owned or operated by the Commonwealth of Massachusetts or municipalities may fall under the MEPA and are the responsibility of the cooperating agency. WS would assist cooperating agencies in complying with any necessary requirements of the MEPA.

X. AFFECTED ENVIRONMENT

Upon receiving a request for assistance, the alternatives could be conducted on private, federal, Commonwealth, tribal, and municipal lands in Massachusetts to reduce damages and threats associated with wildlife to aviation safety and human safety. The analyses in the EA and this supplement 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. The EA and this supplement analyze the potential impacts of wildlife damage management at airports in the Commonwealth and addresses those activities being conducted at airports that are currently under a MOU or cooperative service agreement with WS where activities have been and currently are being conducted. The EA and this supplement also address the impacts of wildlife damage management in the Commonwealth where additional agreements may be signed in the future between WS and a cooperating entity.

Airports

Airports are often secured areas with chain-link security fencing. Sometimes deer, and other mammals, gain entrance into those airports where there is adequate cover and food, and they live there for all or part of the year. Because many mammal species are ubiquitous throughout the Commonwealth, it is possible

for those species to be present at nearly any airport or military airbase. WS may be requested to remove mammals from airport properties at any of the airports or airbases in the Commonwealth where those mammals pose a threat to aircraft and passenger safety. Those mammal species confined inside a perimeter fence on airport property originate from free-ranging populations outside the perimeter fence. Therefore, those mammal species confined on airport property will not be considered a unique population.

Avian species are highly mobile and can pose threats of aircraft strikes if present on, over, or near airport property. Birds feeding, loafing, roosting, and nesting on and/or near airport properties can pose threats to aircraft. The gregarious behavior of many of the bird species addressed in the EA, especially during the migration periods, can pose serious strike risks. WS continually works with airports to identify aspects of the airport property that could be attractive to avian species and to recommended modification of those aspects to discourage the presence of avian species at airports.

Disease Surveillance and Monitoring Activities

Upon receiving a request for assistance, wildlife damage management activities could be conducted on civilian or military airports in the Commonwealth to alleviate threats of damage and threats to human safety. Under the proposed supplement to the EA, WS could conduct disease surveillance and monitoring activities for the purposes of studying, containing, and curtailing disease outbreaks in wildlife populations. Those wildlife species handled for disease sampling would be ancillary to wildlife damage management activities being conducted to alleviate threats of damage to property and human safety at an airport (*i.e.*, wildlife would not be directly live-captured or lethally taken for disease surveillance purposes but if wildlife are live-captured or lethally taken under a selected alternative to alleviate damage or threats of damage associated with aircraft strikes, WS could collect samples from those wildlife species). Disease sampling of wildlife would not be the primary purpose for live-capturing or lethally taking wildlife at airports in the Commonwealth.

XI. ISSUES ANALYZED IN DETAIL

Issues are concerns raised regarding potential environmental problems that might occur from a proposed action. Such issues must be considered in the NEPA decision-making process. Issues relating to the reduction of wildlife damage were raised during the scoping process for WS' programmatic FEIS (USDA 1997) and were considered in the preparation of the EA. Issues related to managing damage and threats associated with wildlife at airports in the Commonwealth were developed by WS in consultation with the USFWS and the MDFW.

The issues analyzed in detail are discussed in Chapter 2 of the EA (USDA 2002). Alternatives developed and identified during the development of the EA to address those issues are discussed in Chapter 3 of the EA (USDA 2002). The following issues were identified during the scoping process for the EA:

- Issue 1 - Effects on target wildlife species populations
- Issue 2 - Effects on non-target species' populations, including T&E species
- Issue 3 - Economic losses to property
- Issue 4 - Effects on human health and safety
- Issue 5 - Effects on aesthetics
- Issue 6 - Humaneness and animal welfare concerns of lethal methods used by WS

Based on those damage management activities conducted previously by WS since the 2002 Decision and FONSI were signed and in consultation with the USFWS and the MDFW, no additional issues have been identified that require detailed analyses. Those issues identified during the development of the EA remain

applicable and appropriate to resolving damage and threats of damage associated with wildlife at airports in the Commonwealth.

XIII. ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

In addition to the issues considered in detail, two other issues were considered in section 2.4 of the EA, but were not analyzed in detail with the rationale provided in the EA. WS has reviewed the issues not considered in detail as described in the EA and has determined that the analyses provided in the EA is still appropriate regarding those issues.

XIV. ALTERNATIVES ANALYZED IN DETAIL

The alternatives considered and evaluated using the identified issues are described and discussed in detail in Chapter 3 of the EA (USDA 2002). In addition, Chapter 4 of the EA analyzes the environmental consequences of each alternative as those alternatives relate to the issues identified (USDA 2002). Appendix B of the EA provides a description of the methods that could be used or recommended by WS under each of the alternatives. The EA describes four potential alternatives that were developed to address the issues identified above. Alternatives analyzed in detail include:

- Alternative 1: Continue the Current Federal Wildlife Damage Management Program/Integrated Wildlife Damage Manage (No Action/Proposed Action)
- Alternative 2: Non-lethal Wildlife Damage Management Only by WS
- Alternative 3: Lethal Wildlife Damage Management Only by WS
- Alternative 4: No Federal WS Wildlife Damage Management

XV. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Three additional alternatives were considered, but not analyzed in detail in the EA. Alternatives considered but not analyzed in detail are discussed in Section 3.4 of the EA (USDA 2002). WS has reviewed the alternatives not analyzed in detail in the EA and has determined that the analyses provided in the EA have not changed and are still appropriate.

XVI. WILDLIFE DAMAGE MANAGEMENT METHODS

A description of the wildlife damage management methods that could be used or recommended by WS is provided in Appendix B of the EA (USDA 2002) and in Appendix J of WS' programmatic FEIS (USDA 1997). Since the completion of the EA, an avian reproductive inhibitor containing the active ingredient nicarbazin has been registered for use in Massachusetts to manage damage associated with pigeons. In addition, a product containing the active ingredient nicarbazin has been registered with the United States Environmental Protection Agency (EPA) as a reproductive inhibitor for Canada geese but is not currently registered for use in the Commonwealth. A reproductive inhibitor under the trade name of GonaCon™ has been registered with the EPA to manage local white-tailed deer populations but is not currently registered for use in Massachusetts. Under the proposed action in the EA, products containing the active ingredient nicarbazin could be used or recommended as part of an integrated damage management strategy to alleviate pigeon damage. Nicarbazin is a restricted-use pesticide that requires a pesticide applicators license to purchase and use. If reproductive inhibitors for managing localized Canada goose populations and white-tailed deer populations become registered for use in the Commonwealth, further evaluation of the use of those products would occur pursuant to the NEPA.

Since nicarbazin is registered for use in Massachusetts to manage local pigeon populations, anyone with the appropriate pesticide applicators license can purchase and use nicarbazin to manage pigeon damage.

Nicarbazin would be available for use by pesticide applicators under any of the alternatives analyzed in the EA.

In addition to those reproductive inhibitors discussed, trap monitors, Forward Looking Infrared (FLIR) devices, and night vision equipment have become available since the completion of the EA. Trap monitors are devices that send a radio signal to a receiver if a set trap is disturbed and alerts field personnel that an animal may be captured. Trap monitors can be attached directly to the trap or attached to a string or wire and then placed away from the trap in a tree or shrub. When the monitor is hung above the ground, it can be detected from several miles away, depending on the terrain in the area. There are many benefits to using trap monitors, such as saving considerable time when checking traps, decreasing fuel usage, prioritizing trap checks, and decreasing the need for human presence in the area. Trap monitors could be used under the proposed supplement where appropriate.

Night vision and FLIR equipment aid in locating wildlife at night when wildlife may be more active. Night vision and FLIR equipment could be used during wildlife surveys and in combination with shooting to remove wildlife at night. WS' personnel most often use this technology to target mammals in the act of causing damage or likely responsible for causing damage. The use of those methods allows WS to conduct activities at night when human activities are minimal, thereby reducing risks to human safety. FLIR and night vision equipment would be used under the proposed supplement where appropriate.

XIII. STANDARD OPERATING PROCEDURES

Standard operating procedures (SOPs) improve the safety, selectivity, and efficacy of wildlife damage management activities. The WS program in the Commonwealth of Massachusetts uses many such SOPs which are discussed in detail in Chapter 3 of the EA (USDA 2002) and in Chapter 5 of WS' programmatic FEIS (USDA 1997). Those SOPs would be incorporated into activities conducted by WS when addressing wildlife threats at airports in the Commonwealth.

XIV. ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

The major issues are discussed in detail in Chapter 2 of the EA (USDA 2002). Alternatives developed and identified during the development of the EA to address those issues are discussed in Chapter 3 of the EA (USDA 2002). Potential impacts of Alternatives 2, Alternative 3, and Alternative 4 on the human environment related to the major issues have not changed from those described in the EA and thus do not require additional analyses in this supplement. Chapter 4 of the EA contains a detailed discussion and comparison of the identified alternatives and the major issues (USDA 2002). The issues were identified as important to the scope of the analysis in the EA (40 CFR 1508.25). Alternative 1 (proposed action/no action), as described in the EA, addresses requests for wildlife damage management at airports in the Commonwealth using an integrated damage management approach by WS to reduce threats of damage to property and human safety at airports. The following is an analysis of potential impacts for each of the major issues analyzed in the EA since the completion of the EA and this supplement to the EA as related to Alternative 1 (proposed action/no action alternative):

Issue 1 - Effects on target wildlife species populations

A common concern when addressing damage associated with wildlife species are the effects on the populations of those species from methods used to manage damage. The integrated approach of managing damage associated with wildlife described in the EA under the proposed action alternative uses both non-lethal and lethal methods to resolve requests for assistance. Although non-lethal methods can disperse wildlife from areas where application occurs, wildlife is generally unharmed. Therefore, adverse effects are not often associated with the use of non-lethal methods. However, methods used to lethally

take wildlife can result in local reductions in those species' populations in the area where damage or threats of damage were occurring.

The analysis for magnitude of impact on populations from the use of lethal methods generally follows the process described in WS' programmatic FEIS (USDA 1997). Magnitude is described in WS' programmatic FEIS as "*...a measure of the number of animals killed in relation to their abundance*." Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population densities are high. WS' take is monitored by comparing numbers of animals killed with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (USDA 1997). All lethal take of wildlife by WS occurs at the requests of a cooperator seeking assistance and only after the appropriate permit has been issued by the USFWS and/or the MDFW, when appropriate.

The issue of the effects on target wildlife species arises from the use of non-lethal and lethal methods identified in the EA to address the need for reducing damage and threats associated with those wildlife species addressed in the EA. Methods employed in an integrated approach to reduce damage and threats are categorized into non-lethal and lethal methods. Non-lethal methods are employed to exclude, harass, and/or disperse wildlife from areas where damage or threats are occurring. Lethal methods are often employed to reinforce non-lethal methods and to remove those wildlife species that have been identified as causing damage or posing a threat to human safety. Both non-lethal and lethal methods have the potential to impact wildlife populations. The EA evaluated those potential impacts and found that when WS' activities are conducted within the scope analyzed in the EA, those activities would not adversely impact wildlife populations in Massachusetts (USDA 2002). WS' SOPs are designed to reduce the effects on wildlife populations and are discussed in section 3.5 of the EA (USDA 2002).

WS has provided direct damage management and technical assistance in response to requests for assistance in Massachusetts since the completion of the EA. Descriptions and application of direct damage management and technical assistance projects are discussed in detail in Chapter 3 of the EA (USDA 2002). All wildlife damage management activities conducted by WS were pursuant to applicable federal, Commonwealth, and local laws and regulations.

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. Information on mammalian wildlife is often derived from published literature, trends, surveys, and harvest data. Further information on particular sources of information is provided below.

Breeding Bird Survey

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 along roadways for a set duration along a pre-determined route. The number and species of birds observed and heard within a quarter of a mile of the survey points are recorded. 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 a combined set of over 3,700 roadside survey routes conducted annually in the continental United States and southern Canada, 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.

2011). 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, as a result of variable local habitat and climatic conditions. Trends can be determined using different population equations and statistically tested to determine if a trend is statistically significant.

Estimates of population trends from BBS data are derived primarily from route-regression analysis (Geissler and Sauer 1990) and are dependent upon a variety of assumptions (Link and Sauer 1998). The statistical significance of a trend for a given species is reflected in the calculated P-value (*i.e.*, the probability of obtaining the observed data or more extreme data given that a hypothesis of no change is true). The level of statistical significance (*e.g.*, 0.01, 0.05, 0.10) can vary and is often set by those conducting the analysis. Often BBS or other geographically large survey data is not statistically significant at the local level because of relatively smaller sample size (*i.e.*, fewer routes surveyed), more routes with zero observations of a particular bird species which results in larger statistical variance and low P-values set for statistical significance. The data reported from the BBS has a statistical level of significance set at $P<0.05$ (Sauer et al. 2011).

Christmas Bird Count

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 and is based on 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 can be used as an indicator of trends in the population. 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).

Annual Harvest Estimate

The populations of several bird and mammal species are sufficient to allow for annual harvest seasons that typically occur during the fall. Bird hunting seasons are established under frameworks developed by the USFWS and implemented in the Commonwealth by the MDFW. Canada geese, snow geese, mallards, wild turkeys, American crows, ring-necked pheasants, Northern bobwhite, American woodcock, ruffed grouse, and common snipe are the species of birds specifically addressed in the EA that have established hunting seasons the Commonwealth. Other waterfowl species and rails that could also be encountered at airport that were not specifically addressed in the EA also have established hunting seasons.

For geese and crows, take can also occur under the several depredation orders established by the USFWS.

Therefore, the take of geese and crows can occur during annual hunting seasons and under depredation orders that allows those species to be taken 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 MDFW in published reports.

Most of the mammalian species addressed can be harvested in the Commonwealth during annual hunting and trapping seasons which are regulated by the MDFW.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2002

WS continued to implement and employ an integrated damage management approach to reducing threats and damage caused by wildlife at and around airports in FY 2002 through the recommendation and use of multiple methods. WS conducted technical assistance projects in FY 2002 involving wildlife damage and threats to human health and safety occurring at airports through the recommendation of methods to resolve damage and threats without WS' direct involvement. Technical assistance was provided through site visits, telephone consultations, and written consultations. WS continued to provide technical assistance through the recommendation of an integrated approach to resolving damage and threats that included lethal and non-lethal methods.

As shown in Table 1, WS employed, through direct operational assistance, non-lethal techniques to harass and disperse 5,783 birds and mammals of 30 species identified as causing damage or threats in the Commonwealth. Dispersal occurred through the use of those non-lethal methods described in Appendix B of the EA, primarily from the use of pyrotechnics and other noise producing methods (USDA 2002). As part of an integrated approach to resolving requests for assistance to manage damage and threats at and around airports, WS also employed lethal methods to reinforce non-lethal techniques and to remove those birds and mammals identified as causing damage or threats. As shown in Table 2, WS employed methods described in the EA to lethally take 808 birds and mammals in FY 2002.

Nearly 60% of the lethal take by WS in Massachusetts during FY 2002 were rock pigeons, European starlings, and house sparrows, which are non-native species in North America. There were 256 rock pigeons, eight house sparrows, and 220 starlings taken at airports that were causing property damage and posing a threat to aviation safety. Pigeons, starlings, and house sparrows were taken either with firearms, live captured in decoy traps, or caught by hand and euthanized using carbon dioxide and cervical dislocation which are euthanasia methods that are approved by the American Veterinary Medical Association (AVMA) for birds (AVMA 2007). Since rock pigeons, house sparrows, and European starlings are afforded no protection under the MBTA, the take of those species can occur without the need for a depredation permit from the USFWS or from the MDFW. Appendix B in the EA (USDA 2002) contains a detailed description of the methods available for use to resolve bird damage in Massachusetts.

Red-winged blackbirds, common grackles, American crows, and brown-headed cowbirds were addressed using non-lethal dispersal methods to protect property and aviation safety. WS dispersed 37 red-winged blackbirds, 10 grackles, and 411 crows. WS used non-chemical lethal methods to take four red-winged blackbirds, four crows, and 166 brown-headed cowbirds to alleviate damage and reduce threats to aviation at airports. All take of blackbirds and crows was conducted under the blackbird depredation order (see 50 CFR 21.43).

WS also addressed strike risks associated with 10 species of mammals at airports in the Commonwealth. A total of 13 striped skunks were lethally removed by WS to alleviate strike risks at airports, which was the highest level of lethal take of any of the mammal species addressed by WS during FY 2002. Although some of the mammal species addressed pose minimal strike risks to aircraft (*e.g.*, white-footed mice, beaver) those species can act as attractants for other wildlife species that pose a higher risk of

aircraft strikes. For example, high densities of mice can attract raptors to airports which are serious strike hazards given their large size, slow movements, and soaring abilities. Beaver can increase strike hazards at airports by impounding water through damming activities. Impounded water can act as an attractant for waterfowl and other aquatic species with can pose strike risks based on their flocking behavior and large size. In addition, beaver can cause damage to airports by burrowing into embankments which can weaken the integrity of the impoundments or fell trees which inhibit access to areas for maintenance. Woodchucks often burrow along buildings and other structures which can weaken those structures resulting in damage. Woodchucks burrow entrances can also can damage to mowing equipment during maintenance operations.

Table 1 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2002

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	0	10	**Gull, (other)***	1,254	0
Blackbird, Red-winged	37	4	**Hawk, Red-tailed**	0	1
Brant, Atlantic	410	0	**Heron, Great Blue**	1	0
Bunting, Snow	234	0	**Ibis, Glossy**	10	0
Cat, Feral/Free range	0	5	**Kestrel, American**	11	0
Cormorant, Double-crested	16	0	**Killdeer**	28	0
Cowbird, Brown-headed	0	166	**Lark, Horned**	514	0
Coyote	2	4	**Mouse, White-footed**	0	2
Crow, American	411	4	**Opossum, Virginia**	0	1
Deer, White-tailed	2	5	**Osprey**	3	1
Dove, Mourning	12	20	**Owl, Snowy**	12	0
Duck, American Black	309	11	**Pigeon, Rock**	103	256
Duck, Mallard	5	3	**Hawk, Northern Harriers**	2	0
Egret, Great	1	0	**Plover (other)***	56	0
Egret, Snowy	11	0	**Raccoon**	0	1
Fox, Red	0	2	**Skunk, Striped**	0	13
Goose, Canada	217	31	**Sparrow, House**	0	8
Grackle, Common	10	0	**Starling, European**	1,693	220
Gull, Great Black-back	13	6	**Swallow, Barn**	47	0
Gull, Herring	311	6	**Turkey, Wild**	43	14
Gull, Ring-billed	5	6	**Woodchuck**	0	8
			TOTAL	**5,783**	**808**

*WS information management system in FY 2002 did not have a species entry for recording all wildlife species addressed but allowed for species to be grouped by guild or common characteristics.

WS also employed non-lethal methods to live-capture five feral cats during FY 2002 at airports in the Commonwealth. Feral cats live-captured were transported and relinquished to a local animal shelter which accepted responsibility for evaluating their health, fitness for adoption, and final disposition.

As shown in Table 2, shooting was the method primarily used to lethally remove wildlife to alleviate strike hazards by WS. Firearms are essentially selective for target species since identification of the target occurs prior to application. The noise associated with the discharge of the firearm also acts to disperse wildlife from areas where strike hazards exist. Target species were also live-captured in box traps, decoy traps, and through the use of hand capture. Those target species live-captured were subsequently euthanized pursuant to WS Directive 2.505. All take by WS occurred within the scope analyzed within in the EA during FY 2002.

Table 2 – WS' take of wildlife in Massachusetts at airports by method, FY 2002

SPECIES	METHOD			TOTAL
	Firearm	Trap*†	Hand Capture†	
Beaver	1	9	0	**10**
Blackbird, Red-winged	4	0	0	**4**
Cat, Feral	0	5	0	**5**
Cowbird, Brown-headed	12	154	0	**166**
Coyote	4	0	0	**4**
Crow, American	4	0	0	**4**
Deer, White-tailed	5	0	0	**5**
Dove, Mourning	19	1	0	**20**
Duck, American Black	11	0	0	**11**
Duck, Mallard	3	0	0	**3**
Fox, Red	2	0	0	**2**
Goose, Canada	31	0	0	**31**
Gull, Great Black-backed	6	0	0	**6**
Gull, Herring	6	0	0	**6**
Gull, Ring-billed	6	0	0	**6**
Hawk, Red-tailed	1	0	0	**1**
Mouse, White-footed	0	0	2	**2**
Opossum, Virginia	0	0	1	**1**
Osprey	1	0	0	**1**
Pigeon, Rock	188	66	2	**256**
Raccoon	0	1	0	**1**
Skunk, Striped	12	1	0	**13**
Sparrow, House	0	8	0	**8**
Starling, European	130	90	0	**220**
Turkey, Wild	14	0	0	**14**
Woodchuck	1	7	0	**8**

*Trap methods include conibear, box and decoy traps.

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2003

WS continued to implement and employ an integrated damage management approach to reducing threats and damage caused by wildlife at and around airports in FY 2003 through the recommendation and use of multiple methods. WS continued to conducted technical assistance projects in FY 2003 involving wildlife damage and threats to human safety through the recommendation of methods to resolve damage and threats without WS' direct involvement.

As shown in Table 3, WS employed, through direct operational assistance, non-lethal techniques to harass and disperse 9,926 birds and mammals identified as causing damage or threats at airports in the Commonwealth. Dispersal occurred through the use of those non-lethal methods described in Appendix B of the EA, primarily from the use of pyrotechnics and other noise producing methods (USDA 2002). Of the 10,244 birds and mammals addressed by WS during FY 2003, nearly 97% were addressed using non-lethal methods of harassment. Nearly 76% of those species addressed using non-lethal methods were Atlantic brant, European starlings, and American crows.

As part of an integrated approach to resolving requests for assistance to manage damage and threats, WS also employed lethal methods to reinforce non-lethal techniques and to remove those birds and mammals

identified as posing a threat of damage. As shown in Table 3, WS employed methods described in the EA to lethally take 318 birds and mammals in FY 2003.

Table 3 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2003

Species	Dispersed	Take	Species	Dispersed	Take
Bat (all)*	0	1	**Gull, (other)***	60	0
Beaver	0	7	**Hawk, Red-tailed**	4	0
Blackbird, Red-winged	6	0	**Heron, Great Blue**	2	0
Brant, Atlantic	3,291	0	**Kestrel, American**	2	0
Bunting, Snow	70	0	**Killdeer**	1	0
Cat, Feral/Free range	1	0	**Lark, Horned**	659	0
Cormorant, Double-crested	48	0	**Mallard**	92	0
Cowbird, Brown-headed	0	13	**Owl, Snowy**	3	0
Coyote	1	7	**Pigeon, Rock**	90	110
Crow, American	1,147	6	**Plover (other)***	23	0
Deer, White-tailed	1	4	**Shorebird (other)***	48	0
Dove, Mourning	27	4	**Skunk, Striped**	0	2
Duck, American Black	15	11	**Starling, European**	3,091	51
Fox, Red	0	1	**Swallow, Barn**	55	0
Goose, Canada	707	27	**Swallow, Tree**	50	0
Grackle, Common	8	0	**Swallow, (mixed)**	150	0
Gull, Great Black-back	2	0	**Turkey, Wild**	91	13
Gull, Herring	134	0	**Vulture, Turkey**	0	4
Gull, Ring-billed	47	1	**Woodchuck**	0	56
			TOTAL	**9,926**	**318**

*WS information management system in FY 2003 did not have a species entry for recording all wildlife species addressed but allowed for species to be grouped by guild or common characteristics.

Lethal take occurred primarily using a firearm which reinforces the noise produced by non-lethal methods (see Table 4). Nearly 51% of the take of birds and mammals by WS during FY 2003 at airports in Massachusetts were rock pigeons and European starlings, both non-native species in North America. Rock pigeons and starlings were taken at airports and were causing property damage and posing a threat to aviation safety. Pigeons and starlings were taken either with firearms or were live captured in decoy traps and euthanized using carbon dioxide or using cervical dislocation which are euthanasia methods that are approved by the AVMA for birds (AVMA 2007). WS addressed a total of 3,342 pigeons and starling during FY 2003 to alleviate threats of damage at airports. Of those 3,342 pigeons and starlings addressed by WS, over 95% were addressed using non-lethal methods to disperse those birds from areas where threats were occurring. Dispersal occurred primarily from pyrotechnics and the noise associated with the discharge of a firearm.

WS also employed traps, firearms, and gas cartridges to lethally remove 56 woodchucks at airports within the Commonwealth to alleviate damage. Woodchucks are often considered indirect hazards because they attract other species that may be struck by aircraft, and they also are known to negatively affect the integrity of runway safety areas and embankments. Woodchucks can cause excessive burrowing damage to areas that require mowing and maintenance at airports which can threaten the safety of airport employees. Woodchuck burrow entrances cause damage to mowing equipment and other maintenance equipment. Airport authorities are also concerned that burrows may undermine pavement which could require extensive repairs. Woodchucks may also damage wiring systems when borrowing occurs near lighting systems and other structures.

Table 4 – WS' take of wildlife in Massachusetts at airports by method, FY 2003

SPECIES	METHOD				TOTAL
	Trap*‡	Firearm	Hand Capture‡	Gas Cartridge	
Bat (all)†	0	0	1	0	**1**
Beaver	5	2	0	0	**7**
Cowbird, Brown-headed	13	0	0	0	**13**
Coyote	0	7	0	0	**7**
Crow, American	0	6	0	0	**6**
Deer, White-tailed	0	4	0	0	**4**
Dove, Mourning	0	4	0	0	**4**
Duck, American Black	0	11	0	0	**11**
Fox, Red	0	1	0	0	**1**
Goose, Canada	0	22	5	0	**27**
Gull, Ring-billed	0	1	0	0	**1**
Pigeon, Rock	40	70	0	0	**110**
Skunk, Striped	0	2	0	0	**2**
Starling, European	0	51	0	0	**51**
Turkey, Wild	0	13	0	0	**13**
Vulture, Turkey	0	4	0	0	**4**
Woodchuck	2	3	0	51	**56**

*Trap methods include conibear, box, and decoy traps.

‡ Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

†WS information management system in FY 2003 did not have a species entry for recording all wildlife species addressed but allowed for species to be grouped by guild or common characteristics.

All take by WS of migratory birds afforded protection under the MBTA occurred pursuant to depredation permits or depredation orders established by the USFWS, when applicable. European starlings and rock pigeons are considered non-native species in North American and are afforded no protection from take under the MBTA; therefore, no depredation permit is required to lethally take those species. The number of birds lethally taken by WS annually is reported to the USFWS and to the MDFW to ensure cumulative take is considered by those management agencies when determining population objectives for individual species. WS' lethal take of birds during FY 2003 occurred within those levels permitted by the USFWS and the MDFW. All take of mammalian species to alleviate threats at airports occurred pursuant to permits issued by the MDFW, when required. WS' take of mammalian species is also reported annually to the MDFW to ensure take is considered cumulatively when determining population objectives for those species.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2004

WS continued to implement and employ an integrated damage management approach to reducing threats and damage caused by wildlife at airports in FY 2004 through the recommendation and use of multiple methods. WS continued to provide technical assistance through the recommendation of an integrated approach to resolving damage and threats that included both lethal and non-lethal methods.

As shown in Table 5, WS employed, through direct operational assistance, non-lethal techniques to harass and disperse 2,735 birds and mammals identified as causing damage or threats to aviation safety in the Commonwealth. Dispersal occurred through the use of those non-lethal methods described in Appendix B of the EA, primarily from the use of pyrotechnics and other noise producing methods (USDA 2002).

WS also employed lethal methods to reinforce non-lethal methods in FY 2004 in an integrated approach to resolving requests for assistance. A total of 135 birds and 45 mammals were lethally removed in the Commonwealth during FY 2004 to reduce strike risks at airports. A total of 48 herring gulls were lethally removed by WS during FY 2004 which was the highest total take of any bird species addressed using lethal methods. Coyotes were the mammal species with the highest number of total take with 11 coyotes lethally removed to alleviate strike risks. Target bird and mammal species that were live-captured were euthanized in accordance with WS Directive 2.505.

Table 5 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2004

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	2	6	**Hawk, Red-tailed**	2	2
Coyote	0	11	**Heron, Great Blue**	1	0
Crow, American	2,100	0	**Moose**	0	1
Deer, White-tailed	2	7	**Pigeon, Rock**	10	8
Dove, Mourning	103	19	**Raccoon**	0	9
Duck, American Black	302	0	**Starling, European**	1	13
Fox, Gray	0	1	**Turkey, Wild**	10	12
Goose, Canada	87	33	**Vulture, Turkey**	2	0
Gull, Herring	113	48	**Woodchuck**	0	10
			TOTAL	**2,735**	**180**

WS also employed non-lethal methods to disperse a total of 2,735 birds and mammals, primarily American crows. WS dispersed a total of 2,100 crows during FY 2004 at airports while no lethal take of crows occurred. Nearly 94% of the wildlife addressed by WS during FY 2004 were addressed using non-lethal methods. WS addressed seven species of mammals in FY 2004 and 11 species of birds. During FY 2004, WS employed gas cartridges to lethally take one woodchuck and represented the only chemical methods employed by WS during FY 2004. The use of gas cartridges to reduce damage to target wildlife is further described in the EA (USDA 2002) and WS' programmatic FEIS (USDA 1997).

Table 6 – WS' take of wildlife in Massachusetts at airports by method, FY 2004

	METHOD			
SPECIES	**Firearm**	**Trap*†**	**Gas Cartridge**	**TOTAL**
Beaver	0	6	0	**6**
Coyote	11	0	0	**11**
Deer, White-tailed	7	0	0	**7**
Dove, Mourning	19	0	0	**19**
Fox, Gray	1	0	0	**1**
Goose, Canada	33	0	0	**33**
Gull, Herring	5	43	0	**48**
Hawk, Red-tailed	2	0	0	**2**
Moose	1	0	0	**1**
Pigeon, Rock	1	7	0	**8**
Raccoon	0	9	0	**9**
Starling, European	13	0	0	**13**
Turkey, Wild	12	0	0	**12**
Woodchuck	2	7	1	**10**

*Trap methods include conibear, decoy, and box traps and hand-capture.

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

All take by WS occurred pursuant to appropriate permits or orders issued by the USFWS and/or the MDFW, when applicable. Target wildlife live-captured in decoy traps, box traps, or hand-captured were euthanized in accordance with WS Directive 2.505.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2005

WS' wildlife damage management activities on and around airports in FY 2005 were similar to the implementation of the proposed action in previous years. WS continued to provide direct operational assistance in Massachusetts during FY 2005 to those persons requesting assistance with reducing or preventing damage or threats to human health and safety caused by wildlife. Table 7 shows the total number of individuals of each species non-lethally dispersed or lethally taken by WS in FY 2005 during projects at airports. A total of 87 birds from four species were addressed using non-lethal methods during FY 2005 and 228 birds from 10 species and 100 mammals from nine species were addressed using lethal methods. Of the individual animals lethally removed in Massachusetts during FY 2005, slightly more than 25% were rock pigeons, house sparrows, and European starlings, which are non-native species in North America.

Table 7 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2005

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	0	10	**Phoebe, Eastern**	0	4
Cowbird, Brown-headed	0	20	**Pigeon, Rock**	10	36
Coyote	0	3	**Skunk, Striped**	0	2
Deer, White-tailed	0	7	**Sparrow, House**	0	4
Dove, Mourning	0	91	**Squirrel, Red**	0	11
Fox, Red	0	6	**Starling, European**	0	42
Goose, Canada	46	8	**Swallow, Barn**	0	1
Gull, Herring	1	4	**Turkey, Wild**	30	18
Moose	0	1	**Woodchuck**	0	59
			TOTAL	**87**	**327**

As part of an integrated approach to resolving requests for assistance to manage damage and threats at airports, WS employed lethal methods to reinforce non-lethal techniques and to remove those birds and mammals identified as causing damage or threats to aviation safety. As shown in Table 8, WS employed methods described in the EA to lethally take 228 birds and 99 mammals to reduce strike risks in FY 2005. Lethal take occurred primarily using a firearm which reinforces the noise produced by non-lethal methods. However, WS also employed box traps, hand capture methods, and gas cartridges to address risks of aircraft strikes. Birds live captured by hand were euthanized using cervical dislocation or carbon dioxide (CO_2) gas, which are euthanasia methods that are approved by the AVMA for birds (AVMA 2007).

WS lethally removed a total of 91 mourning doves in FY 2005 using firearms. Doves often congregate in large flocks at airports during the spring and fall migration periods. Large flocks of doves can increase strike hazards, since strikes are likely to involve multiple birds which increases damage and increases the likelihood of engine failure if birds are ingested into aircraft engines.

WS also addressed 11 red squirrels at airports in the Commonwealth during FY 2005. High densities of squirrels can often act as attractants for other wildlife species that pose strike risks to aircraft, such as raptors and carnivores. In addition, red squirrels can gnaw on cables and other structures which cause property damage. To alleviate damage and threats of damage associated with red squirrels, WS employed firearms to lethally take 11 squirrels. All lethal take of birds and mammals by WS during FY 2005

occurred pursuant to permits and orders issued or established by the USFWS and/or the MDFW. Take of those species were reported to the USFWS and the MDFW

Table 8 – WS' take of wildlife in Massachusetts at airports by method, FY 2005

SPECIES	METHOD				TOTAL
	Firearm	Box Trap†	Hand Capture†	Gas Cartridge	
Beaver	10	0	0	0	**10**
Cowbird, Brown-headed	20	0	0	0	**20**
Coyote	3	0	0	0	**3**
Deer, White-tailed	7	0	0	0	**7**
Dove, Mourning	91	0	0	0	**91**
Fox, Red	6	0	0	0	**6**
Goose, Canada	8	0	0	0	**8**
Gull, Herring	0	0	4	0	**4**
Moose	1	0	0	0	**1**
Phoebe, Eastern	0	0	4	0	**4**
Pigeon, Rock	36	0	0	0	**36**
Skunk, Striped	2	0	0	0	**2**
Sparrow, House	4	0	0	0	**4**
Squirrel, Red	11	0	0	0	**11**
Starling, European	42	0	0	0	**42**
Swallow, Barn	0	0	1	0	**1**
Turkey, Wild	18	0	0	0	**18**
Woodchuck	35	1	0	23	**59**

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2006

As described in detail in the EA, WS' wildlife damage management activities at airports in FY 2006 were similar to the implementation of the proposed action in previous years. WS continued to provide technical assistance and direct operational damage management to those persons requesting assistance with managing damage caused by wildlife during FY 2006. WS continued to receive requests for assistance with several bird and mammal species in Massachusetts.

WS continued to receive requests to conduct direct operational assistance at airports in FY 2006 involving damage and threats associated with wildlife in Massachusetts. Requests for direct operational assistance by WS involved 18 species of wildlife (see Table 9). WS addressed five species of mammals and 13 species of birds at airports in the Commonwealth.

WS employed non-lethal methods to disperse 2,232 birds and mammals of eight different species at airports in Massachusetts during FY 2006 using vehicle chasing and harassment shooting. Non-lethal dispersal consisted of 2,000 European starlings, 100 mallards, 52 American black ducks, 43 Canada geese, 20 wood ducks, 10 American crows, five coyotes, and two turkey vultures.

Table 10 displays lethal methods employed by WS to lethally take the 522 birds and 48 mammals of 18 different species at airports in Massachusetts during FY 2006 to protect aviation safety. Over 82% of all lethal take conducted by WS in FY 2006 occurred using a firearm or air rifle. The noise associated with the discharge of a firearm reinforces the noise produced by many non-lethal methods. Birds live captured by decoy trap or hand were euthanized using cervical dislocation or CO_2 gas which are euthanasia methods that are approved by the AVMA for birds (AVMA 2007).

Of the individual animals lethally removed at airports in Massachusetts to protect aviation safety during FY 2006, over 62% were rock pigeons, house sparrows, and European starlings. Pigeons, house sparrows, and starlings are non-native species in Massachusetts that are closely associated with human activities and often compete with native species for food and nesting habitat.

Table 9 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2006

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	0	1	**Fox, Red**	0	1
Cowbird, Brown-Headed	0	22	**Goose, Canada**	43	96
Coyote	5	3	**Gull, Herring**	0	2
Crow, American	10	1	**Pigeon, Rock**	0	50
Deer, White-Tailed	0	8	**Sparrow, House**	0	3
Dove, Mourning	0	33	**Starling, European**	2,000	304
Duck, American Black	52	2	**Turkey, Wild**	0	5
Duck, Mallards	100	7	**Vulture, Turkey**	2	1
Duck, Wood	20	1	**Woodchuck**	0	30
			TOTAL	**2,232**	**570**

Herring gulls nesting on rooftops and Canada geese nesting in wetlands adjacent to airports caused damage to property and posed a threat to aviation safety in Massachusetts during FY 2006. To reduce damage and threats of aircraft strikes, WS employed egg and nest removal or treatment using corn oil to discourage further nesting and to disperse those birds to other areas. WS removed and destroyed 54 herring gull nests containing 108 eggs and treated 11 Canada goose nests containing 59 eggs.

Table 10 – WS' take of wildlife in Massachusetts at airports by method, FY 2006

SPECIES	METHOD				TOTAL
	Firearm	Decoy Trap†	Hand Capture†	Gas Cartridge	
Beaver	1	0	0	0	**1**
Cowbird, Brown-headed	4	18	0	0	**22**
Coyote	3	0	0	0	**3**
Crow, American	1	0	0	0	**1**
Deer, White-tailed	8	0	0	0	**8**
Dove, Mourning	33	0	0	0	**33**
Duck, American Black	2	0	0	0	**2**
Duck, Mallard	7	0	0	0	**7**
Duck, Wood	1	0	0	0	**1**
Fox, Red	1	0	0	0	**1**
Goose, Canada	96	0	0	0	**96**
Gull, Herring	2	0	0	0	**2**
Pigeon, Rock	49	0	1	0	**50**
Sparrow, House	3	0	0	0	**3**
Starling, European	226	78	0	0	**304**
Turkey, Wild	5	0	0	0	**5**
Vulture, Turkey	1	0	0	0	**1**
Woodchuck	26	0	0	4	**30**

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

All lethal take of birds and mammals by WS during FY 2006 occurred pursuant to permits and orders issued or established by the USFWS and/or the MDFW.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2007

WS continued to receive requests for assistance to manage damage and threats to aviation safety associated with wildlife in Massachusetts during FY 2007. To respond to those requests for assistance, WS provided both technical assistance and direct operational assistance through the recommendation or direct use of damage management methods. To effectively resolve requests for assistance, WS continued to employ methods in an integrated approach using both lethal and non-lethal methods to resolve or prevent damages and threats associated with wildlife.

Table 11 shows the number of birds and mammals addressed by WS at airports as part of an integrated approach to resolving requests to manage damage or threats in Massachusetts during FY 2007 through direct operational assistance. WS addressed 30 species of wildlife during FY 2007 through direct operational assistance (see Table 11). WS used lethal methods to take 551 birds and mammals in FY 2007. Birds live captured by cage trap, net gun/launcher, or by hand capture were euthanized using cervical dislocation or CO_2 gas which are euthanasia methods that are approved by the AVMA for birds (AVMA 2007).

Of the wildlife addressed to protect aviation safety in Massachusetts during FY 2007 by WS, over 93% were non-lethally harassed to resolve requests for assistance using vehicle chasing, pyrotechnics, harassment shooting, and other visual and noise producing methods. This represents an increase of over 230% above the number of individual birds and mammals non-lethally dispersed at airports in Massachusetts during FY 2006.

Table 11 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2007

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	0	8	**Heron, Great Blue**	1	3
Coyote	6	12	**Heron, Green**	0	1
Crow, American	1,564	2	**Lark, Horned**	10	10
Deer, White-tailed	4	8	**Pigeon, Rock**	26	174
Dove, Mourning	106	48	**Skunk, Striped**	0	7
Duck, American Black	53	4	**Sparrow, House**	0	2
Duck, Mallard	453	13	**Squirrel, Gray**	0	2
Duck, Merganser, Common	2	0	**Starling, European**	2,635	54
Duck, Wood	2	2	**Swallow, Bank**	30	0
Fox, Red	1	3	**Swallow, Barn**	570	2
Goose, Canada	1,093	116	**Swallow, Tree**	530	0
Gull, Great Black-backed	0	4	**Swan, Mute**	0	4
Gull, Herring	248	35	**Turkey, Wild**	1	8
Gull, Ring-billed	0	3	**Vulture, Turkey**	29	3
Hawk, Red-tailed	7	0	**Woodchuck**	3	23
			TOTAL	**7,374**	**551**

To reinforce non-lethal methods to reduce habituation and to address wildlife identified as posing a consistent threat or identified as repeatedly causing damage at airports, WS employed lethal methods that resulted in the take of 551 birds and mammals in FY 2007. Over 42% of the take consisted of European starlings, house sparrows, rock pigeons, and mute swans which are all non-native bird species to North

America and are afforded no protection from take by the MBTA. WS used non-lethal methods to disperse 2,635 starlings and lethal methods to remove 54 European starlings in FY 2007 to reduce threats to property and aviation from bird strikes. WS used shooting with firearms and air rifles to take 162 rock pigeons, two house sparrows, and four mute swans and disperse 26 rock pigeons at airports in Massachusetts (see Table 12). Starlings, pigeons, house sparrows, and mute swans are closely associated with human activities and often compete with native species for food and nesting habitat.

Table 12 – WS' take of wildlife in Massachusetts at airports by method, FY 2007

SPECIES	METHOD				TOTAL
	Firearm	Cage Trap†	Hand Capture†	Net Gun†	
Beaver	6	2	0	0	**8**
Coyote	12	0	0	0	**12**
Crow, American	2	0	0	0	**2**
Deer, White-tailed	8	0	0	0	**8**
Dove, Mourning	48	0	0	0	**48**
Duck, American Black	4	0	0	0	**4**
Duck, Mallard	13	0	0	0	**13**
Duck, Wood	2	0	0	0	**2**
Fox, Red	3	0	0	0	**3**
Goose, Canada	108	0	0	8	**116**
Gull, Great Black-backed	0	0	3	1	**4**
Gull, Herring	22	0	0	13	**35**
Gull, Ring-billed	3	0	0	0	**3**
Heron, Great Blue	3	0	0	0	**3**
Heron, Green	1	0	0	0	**1**
Lark, Horned	10	0	0	0	**10**
Pigeon, Rock	162	0	12	0	**174**
Skunk, Striped	1	6	0	0	**7**
Sparrow, House	2	0	0	0	**2**
Squirrel, Gray	1	1	0	0	**2**
Starling, European	54	0	0	0	**54**
Swallow, Barn	2	0	0	0	**2**
Swan, Mute	4	0	0	0	**4**
Turkey, Wild	8	0	0	0	**8**
Vulture, Turkey	3	0	0	0	**3**
Woodchuck	23	0	0	0	**23**

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

American crows were also addressed to protect property and aviation safety. WS dispersed 1,564 crows in FY 2007 using non-lethal dispersal methods. WS used non-chemical lethal methods to take two crows to alleviate damage and reduce threats to aviation at an airport or a landfill site within 10,000 feet of an active airfield.

WS' operational activities were also conducted to control rooftop nesting herring and great black-backed gulls and nesting Canada geese in wetlands adjacent to airports in Massachusetts during FY 2007. Gulls nesting on rooftops caused damage to property and posed a threat to aviation safety as they crossed airport movement areas traveling back and forth from nesting sites to feeding areas in Massachusetts. Similarly, Canada geese nesting in wetlands adjacent to airfields often enter airfields to feed in available grass. To reduce damage and threats of aircraft strikes, WS employed egg and nest removal for gulls and treatment of eggs in nests of Canada geese with corn oil. During FY 2007, WS removed and destroyed

four great black-backed gull nests containing 10 eggs and 80 herring gull nests containing 85 eggs and treated 77 Canada goose eggs in 14 nests at locations adjacent to airports in Massachusetts. All lethal take of birds and mammals by WS during FY 2007 occurred pursuant to permits and orders issued or established by the USFWS and/or the MDFW.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2008

WS continued to receive requests for assistance to manage damage and threats associated with wildlife in Massachusetts during FY 2008. To respond to those requests for assistance, WS provided both technical assistance and direct operational assistance through the recommendation or direct use of damage management methods. To effectively resolve requests for assistance, WS continued to employ methods in an integrated approach using both lethal and non-lethal methods to resolve or prevent damages and threats associated with wildlife.

Table 13 shows the number of birds and mammals addressed by WS as part of an integrated approach to resolving requests to manage damage or threats in Massachusetts during FY 2008 through direct operational assistance. WS addressed 35 species of wildlife at airports during FY 2008 through direct operational assistance which was an almost 17% increase over the 30 individual species addressed in FY 2007. Although there was an increase in the number of species addressed, the number of individual species where lethal control was necessary decreased from 27 in FY 2007 to 23 in FY 2008, a decrease of almost 15%.

WS used lethal methods to take 650 birds and mammals at airports in FY 2008, an increase of 99 individuals lethally removed in FY 2007. This is an increase of almost 18% in the total number of individuals lethally taken by WS at airports in FY 2007. This rise in the number of individual animals lethally taken can be directly attributed to an increase in lethal European starling management, 111 more starlings were taken in FY 2008 than in FY 2007.

Table 13 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2008

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	0	13	**Hawk, Red-tailed**	11	0
Cormorant, Double Crested	9	0	**Heron, Great Blue**	13	1
Cowbird, Brown-headed	0	3	**Heron, Night, Black-crowned**	3	0
Coyote	8	13	**Lark, Horned**	33	0
Crow, American	7,231	51	**Meadowlark, Eastern**	1	0
Deer, White-tailed	18	21	**Osprey**	14	0
Dove, Mourning	74	68	**Parakeet, Monk**	0	1
Duck, American Black	446	11	**Pigeon, Rock**	0	54
Duck, Mallard	555	40	**Plover, Semipalmated**	40	0
Duck, Merganser, Hooded	0	1	**Raven, Common**	14	0
Duck, Teal, Blue-winged	2	0	**Sandpiper, Semipalmated**	47	0
Duck, Wood	5	6	**Sparrow, House**	0	22
Fox, Red	0	1	**Starling, European**	15,338	165
Goose, Brant, Atlantic	116	1	**Turkey, Wild**	27	23
Goose, Canada	964	97	**Vulture, Turkey**	138	3
Gull, Great Black-backed	24	0	**Whimbrel**	5	0
Gull, Herring	967	23	**Woodchuck**	0	26
Gull, Ring-billed	417	6	**TOTAL**	**26,520**	**650**

WS increased activities at landfills adjacent to airfields in FY 2008 which significantly increased non-lethal harassment activities to address aviation safety. WS also initiated year long Wildlife Hazard Assessments at a certificated Massachusetts airport. WS employed non-lethal methods to disperse 26,520 birds and mammals at and around airports in Massachusetts during FY 2008 using vehicle chasing, pyrotechnics, harassment shooting, chasing on foot, and other visual and noise producing methods. This represented an increase of almost 260% over the 7,374 birds and mammals non-lethally dispersed at airports in FY 2007.

Table 14 – WS' take of wildlife in Massachusetts at airports by method, FY 2008

	METHOD					
SPECIES	**Firearms**	**Traps*†**	**Nets**†**	**Hand Capture†**	**Gas Cartridges**	**TOTAL**
Beaver	2	11	0	0	0	**13**
Cowbird, Brown-headed	3	0	0	0	0	**3**
Coyote	13	0	0	0	0	**13**
Crow, American	51	0	0	0	0	**51**
Deer, White-tailed	21	0	0	0	0	**21**
Dove, Mourning	67	0	0	1	0	**68**
Duck, American Black	11	0	0	0	0	**11**
Duck, Mallard	40	0	0	0	0	**40**
Duck, Merganser, Hooded	1	0	0	0	0	**1**
Duck, Wood	6	0	0	0	0	**6**
Fox, Red	1	0	0	0	0	**1**
Goose, Brant, Atlantic	1	0	0	0	0	**1**
Goose, Canada	76	0	12	9	0	**97**
Gull, Herring	17	0	0	6	0	**23**
Gull, Ring-billed	6	0	0	0	0	**6**
Heron, Great Blue	1	0	0	0	0	**1**
Parakeet, Monk	1	0	0	0	0	**1**
Pigeon, Rock	38	14	0	2	0	**54**
Sparrow, House	3	19	0	0	0	**22**
Starling, European	44	121	0	0	0	**165**
Turkey, Wild	23	0	0	0	0	**23**
Vulture, Turkey	3	0	0	0	0	**3**
Woodchucks	23	0	0	0	3	**26**

* Trap methods include conibear, decoy, and cage traps.

† Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

** Nets include hand nets and net guns.

Of the wildlife addressed to protect aviation safety in Massachusetts during FY 2008 by WS, nearly 98% were non-lethally harassed to resolve requests for assistance. As stated above, to reinforce non-lethal methods to reduce habituation and to address wildlife identified as posing a consistent threat or identified as repeatedly causing damage, WS employed lethal methods that resulted in the take of 650 birds and mammals in FY 2008. Over 37% of the lethal take consisted of European starlings, house sparrows, rock pigeons, and monk parakeets which are non-native bird species to North America.

At airports, WS dispersed 967 herring gulls, 417 ring-billed gulls, and 24 great black-backed gulls. Gulls nesting on rooftops and crossing active airport approaches and movement areas to reach feeding areas caused damage to property and posed a threat to aviation safety. To reduce damage and threats of aircraft strikes, WS employed an integrated approach to resolving those threats that included dispersing gulls,

removing nests and eggs and lethally removing 23 herring gulls and six ring-billed gulls from areas on or within 10,000 feet of active airports. Of all the gulls addressed by WS in FY 2008, 98% were non-lethally dispersed using harassment methods. WS removed 120 herring gull nests (active, inactive, and re-nests) containing 238 eggs. Nest and egg removal and destruction is considered a non-lethal control method and is intended to disperse nesting colonies from rooftops to natural sites.

Firearms were the primary method employed to lethally take birds and mammals to protect aviation safety during FY 2008. Cage and decoy traps, hand nets, net guns, and hand capture were also employed in FY 2008 to live-capture birds and mammals. Firearms and net guns can reinforce non-lethal methods and the noise produced can effectively disperse additional birds when employed. All lethal take of birds and mammals by WS during FY 2008 occurred pursuant to permits and orders issued or established by the USFWS and/or the MDFW.

Wildlife Damage Management Conducted at Airports in Massachusetts by WS during FY 2009

WS received requests for assistance to manage damage and threats associated with wildlife in Massachusetts during FY 2009. To respond to those requests for assistance, WS provided both technical assistance and direct operational assistance through the recommendation or direct use of damage management methods. To effectively resolve requests for assistance, WS continued to employ methods in an integrated approach using both lethal and non-lethal methods to resolve or prevent damages and threats associated with wildlife.

Table 15 shows the number of birds and mammals addressed by WS as part of an integrated approach to resolving requests to manage damage or threats at or around airports in Massachusetts during FY 2009 through direct operational assistance. WS addressed at least 68 species of wildlife during FY 2009 through direct operational assistance which was over a 94% increase in the total number of individual species addressed in FY 2008. WS used lethal methods to take 2,820 birds and mammals at airports in Massachusetts during FY 2009. This is an increase of almost 334% in the total number of individuals lethally removed by WS in FY 2008, which occurred based on the increased number of European starlings addressed at airports. Of the total take at airports in FY 2009, over 72% of the take were European starlings. Excluding the increase in take of starlings, airport related take in Massachusetts only increased 21% in FY 2009.

WS entered into two new agreements to conduct Wildlife Hazard Assessments at certificated airports in FY 2009. Those new agreements resulted in an increase in the lethal take and non-lethal harassment activities to address aviation safety. WS employed non-lethal methods to disperse 150,750 birds and mammals at airports in Massachusetts during FY 2009 using vehicle chasing, pyrotechnics, harassment shooting, propane cannons, spotlights, and other visual and noise producing methods. The number of individuals addressed by WS using non-lethal harassment methods during FY 2009 represented an increase of 468% over the number of individuals addressed by WS in FY 2008 at airports. Non-lethal dispersal of European starlings resulted in most of the increase in total wildlife dispersed in FY 2009, similar to the increase in lethal take. Of the 150,750 birds and mammals non-lethally dispersed in FY 2009, 121,654 were starlings, or nearly 80.7%. This was an increase of 693.2% over the number of starlings non-lethally dispersed in FY 2008.

Of the wildlife addressed to protect aviation safety in Massachusetts during FY 2009 by WS, over 98% were non-lethally harassed to resolve requests for assistance. As stated above, to reinforce non-lethal methods to reduce habituation and to address wildlife identified as posing a consistent threat or identified as repeatedly causing damage, WS employed lethal methods that resulted in the take of 2,820 birds and mammals in FY 2009 (see Table 16). Additionally, WS live captured and turned over to a licensed wildlife rehabilitator one American kestrel found injured on an airport, live captured and translocated

three snowy owls found frequenting an airport, and captured a free ranging domestic dog found on an airfield and returned it to its owner.

Table 15 – Number of wildlife addressed at airports in Massachusetts by WS, FY 2009

Species	Dispersed	Take	Species	Dispersed	Take
Beaver	2	14	**Gull, Herring**	2,049	63
Blackbird, Red-winged	54	0	**Gull, Ring-billed**	1,194	22
Bobcat	3	0	**Hawk, Cooper's**	1	0
Bobolink	150	0	**Hawk, Harrier, Northern**	7	0
Bunting, Snow	135	0	**Hawk, Red-shouldered**	1	0
Catbird, Gray	1	0	**Hawk, Red-tailed**	54	1
Cat, Feral/Free Ranging	3	0	**Heron, Great Blue**	11	7
Cowbird, Brown-headed	1,481	58	**Killdeer**	46	0
Coyote	18	22	**Kingbird, Eastern**	1	0
Crow, American	10,721	100	**Lark, Horned**	18	0
Deer, White-tailed	19	23	**Mouse, White-footed**	0	2
Dove, Mourning	394	17	**Osprey**	6	2
Dowitcher, Short-billed	150	0	**Owl, Barred**	2	0
Duck, American Black	3,221	29	**Owl, Snowy**	3	0
Duck, Eider, Common	45	0	**Parakeet, Budgerigar**	1	0
Duck, Mallard	2,061	31	**Pheasant, Ring-necked**	2	0
Duck, Ring-necked	10	0	**Pigeon, Rock**	106	36
Duck, Scaup, Lesser	1,300	0	**Plover, Black-bellied**	27	0
Duck, Teal, Blue-winged	2	0	**Rabbit, Cottontail**	157	0
Duck, Teal, Green-winged	30	3	**Raven, Common**	83	0
Duck, Wigeon, American	40	0	**Robin, American**	418	0
Eagle, Bald	4	0	**Sandpiper, Semipalmated**	45	0
Egret, Great	4	0	**Sandpiper, Upland**	2	0
Falcon, American Kestrel	84	0	**Skunk, Striped**	4	3
Falcon, Merlin	1	0	**Sparrow, House**	967	35
Falcon, Peregrine	2	0	**Starling, European**	121,654	2,034
Fisher	1	0	**Swallow, Barn**	316	0
Flicker, Northern	4	0	**Swallow, Tree**	425	2
Fox, Gray	0	1	**Swan, Mute**	0	2
Fox, Red	4	6	**Turkey, Wild**	61	52
Goose, Brant, Atlantic	583	0	**Vulture, Turkey**	101	1
Goose, Canada	2,379	180	**Woodpecker, Pileated**	1	0
Grouse, Ruffed	1	0	**Woodchuck**	3	65
Gull, Great Black-backed	75	9	**Yellowleg, Greater**	2	0
			TOTAL	**150,750**	**2,820**

Almost 75% of all lethal take at airports in Massachusetts during FY 2009 consisted of European starlings, rock pigeons, house sparrows, and mute swans which are non-native bird species to North America. WS used non-lethal methods to disperse 121,654 starling and lethal methods to remove 2,034 starlings in FY 2009 to reduce threats property and aviation from bird strikes. Similarly, WS used pyrotechnics and other noise-producing methods to disperse 106 rock pigeons and 967 house sparrows and used lethal methods to remove 36 rock pigeons, 35 house sparrows, and two mute swans at airports in

Massachusetts. There was one budgerigar parakeet, believed to be an escaped pet, harassed away from an airport. This bird was associating with a large flock of European starlings.

WS' operational activities were also conducted to alleviate damage associated with gulls at airports in Massachusetts during FY 2009. WS dispersed 2,049 herring gulls, 1,194 ring-billed gulls, and 75 great black-backed gulls. Gulls nesting on rooftops and crossing active airport approaches and movement areas to reach feeding areas caused damage to property and posed a threat to aviation safety. To reduce damage and threats of aircraft strikes, WS employed an integrated approach to resolving those threats that included dispersing gulls, removing nests and eggs and lethally removing 63 herring gulls, 22 ring-billed gulls, and nine great black-backed gulls to alleviate threats of aircraft strikes. Of all the gulls addressed by WS in FY 2009, over 97% were non-lethally dispersed using harassment methods. WS also removed three active great black-backed gull nests containing seven eggs and 412 herring gull nests (active, inactive, and re-nests) containing 580 eggs. Nest and egg removal and destruction is considered a non-lethal control method and is intended to relocate nesting colonies from rooftops to natural sites.

Table 16 – WS' take of wildlife in Massachusetts at airports by method, FY 2009

SPECIES	METHOD							TOTAL
	Firearm	Body-gripping	Decoy Trap†	Cage Trap†	Hand Caught†	Net Gun†	Gas Cartridge	
Beaver	0	14	0	0	0	0	0	**14**
Cowbird, Brown-headed	46	0	12	0	0	0	0	**58**
Coyote	22	0	0	0	0	0	0	**22**
Crow, American	100	0	0	0	0	0	0	**100**
Deer, White-tailed	23	0	0	0	0	0	0	**23**
Dove, Mourning	17	0	0	0	0	0	0	**17**
Duck, American Black	29	0	0	0	0	0	0	**29**
Mallards	31	0	0	0	0	0	0	**31**
Teal, Green-winged	3	0	0	0	0	0	0	**3**
Fox, Gray	1	0	0	0	0	0	0	**1**
Fox, Red	6	0	0	0	0	0	0	**6**
Geese, Canada	142	0	0	0	25	13	0	**180**
Gull, Great Black-backed	9	0	0	0	0	0	0	**9**
Gull, Herring	57	0	0	0	6	0	0	**63**
Gull, Ring-billed	22	0	0	0	0	0	0	**22**
Hawk, Red-tailed	1	0	0	0	0	0	0	**1**
Heron, Great Blue	7	0	0	0	0	0	0	**7**
Mouse, White-footed	0	2	0	0	0	0	0	**2**
Osprey	2	0	0	0	0	0	0	**2**
Pigeon, Rock	36	0	0	0	0	0	0	**36**
Skunk, Striped	3	0	0	0	0	0	0	**3**
Sparrow, House	24	0	11	0	0	0	0	**35**
Starling, European	785	0	1,247	0	2	0	0	**2,034**
Swallow, Tree	2	0	0	0	0	0	0	**2**
Swan, Mute	2	0	0	0	0	0	0	**2**
Turkey, Wild	52	0	0	0	0	0	0	**52**
Vulture, Turkey	1	0	0	0	0	0	0	**1**
Woodchuck	45	0	0	1	0	0	19	**65**

†Target species were live-captured using those methods indicated but were euthanized in accordance with WS Directive 2.505.

Firearms were the primary lethal method employed by WS during FY 2009 to alleviate strikes risks. Target species live-captured were euthanized pursuant to WS Directive 2.505. All lethal take of birds and mammals by WS during FY 2009 occurred pursuant to permits and orders issued or established by the USFWS and/or the MDFW.

Population Impact Analysis from WS' Activities at Airports in the Commonwealth

WS' cumulative take of birds and mammals by species from FY 2002 through FY 2009 is shown in Table 17 and Table 18, respectively. With the exceptions of mourning doves and wild turkeys, total take of individual species did not exceed anticipated annual take during any year of the eight-year period. However, the average annual take for those species over the eight year period never exceeded the anticipated annual take. To ensure WS' take and take by other entities does not adversely affect those species' populations, further population impact analyses would occur for doves and turkeys.

The EA evaluated an annual take of up to 50 mourning doves in the Commonwealth to alleviate threats occurring at airports. In FY 2005 and FY 2008, WS exceeded the anticipated annual take of mourning doves at airports in Massachusetts by 41 and 18 individuals, respectively. This was due to WS' observation of hazards associated with doves during operational management projects. Although the anticipated annual take for doves was exceeded in FY 2005 and FY 2008, annual take averaged less than 38 mourning doves annually during the eight-year period. This represents only 75% of the annual take analyzed for mourning doves. The mourning dove is one of the most widely distributed and abundant birds in North America (Peterjohn et al. 1994). The fall population for the United States was recently estimated to be about 350 million doves (Otis et al. 2008). Mourning doves are a game species and are the most harvested migratory game bird in the United States with an estimated 17 million doves harvested each year during the 2008 hunting season and the 2009 hunting seasons nationwide (Sanders and Parker 2010). Mourning doves are not hunted in Massachusetts, or in the rest of New England, New York, and New Jersey, with the exception of Rhode Island. The Partners in Flight Landbird Population Estimate database estimated the Massachusetts population of mourning doves at 260,000 individuals.

According to BBS trend data provided by Sauer et al. (2011), mourning dove populations have increased at an annual rate of 1.5% in Massachusetts since 1966, which is statistically significant. BBS routes across the northeast region of the United States are also showing a statistically significant annual increase estimated at 0.5% since 1966 (Sauer et al. 2011). From 2001 through 2010, the number of mourning doves heard per route during surveys conducted in New England has shown an increase estimated at 1.8% (Sanders and Parker 2010). From 2001 through 2010, the number of mourning doves seen along call-count survey routes has increased 2.9% in the New England states (Sanders and Parker 2010). CBC data shows a stable to slightly declining trend in the number of doves observed wintering in the Commonwealth (NAS 2010).

With a population estimated at 260,000 doves, WS' take of 91 doves in FY 2005 would have represented 0.04% of the statewide breeding population. If populations had remained at least stable, the take of 68 doves by WS during FY 2008 would have represented 0.03% of the estimated population. Based on available surveys, the breeding population of mourning doves has shown increasing trends; therefore, the limited take by WS that occurred in FY 2005 and FY 2008 did not adversely affect populations of doves. WS would continue to annually review the number of doves lethally taken to alleviate damage in the Commonwealth. If the number of doves continues to exceed the level of take evaluated in the EA, a supplemental assessment would occur to evaluate a higher level of anticipated annual take by WS to ensure cumulative take does not reach a magnitude where adverse effects would occur. All take, including the take that occurred in FY 2005 and FY 2008, occurred within permitted take levels allowed by the USFWS and the MDFW.

In FY 2009, WS also exceeded the anticipated annual take of wild turkeys at airports in Massachusetts. The lethal take of 52 turkeys in FY 2009 exceed the level evaluated in the EA by two individuals. Take exceeded the level analyzed due to WS' observation of hazards caused by turkeys during operational management activities at Massachusetts airports. Although the anticipated annual take for turkeys was exceeded in FY 2009, annual take averaged less than 19 turkeys during the eight-year period. The average annual take represented 36.2% of the annual take analyzed for wild turkeys. Wild turkeys are a game species in Massachusetts with annual hunting seasons. The MDFW (2010) reported that 3,185 turkeys were harvested during the fall 2008 and spring 2009 hunting seasons, which correspond to FY 2009. WS' take of 52 wild turkeys during FY 2009 represented 1.6% of the reported Massachusetts harvest during the fall 2008 and spring 2009 hunting seasons.

Table 17 – WS' total take of birds at airports in Massachusetts, FY 2002 – FY 2009

Species	Fiscal Year								Total Take	Average Annual Take
	2002	2003	2004	2005	2006	2007	2008	2009		
Blackbirds, Red-winged	4	0	0	0	0	0	0	0	**4**	**0.5**
Cowbirds, Brown-Headed	166	13	0	20	22	0	3	58	**282**	**35.3**
Crows, American	4	6	0	0	1	2	51	100	**164**	**20.5**
Doves, Mourning	20	4	19	91	33	48	68	17	**300**	**37.5**
Ducks, American Black	11	11	0	0	2	4	11	29	**68**	**8.5**
Ducks, Mallards	3	0	0	0	7	13	40	31	**94**	**11.8**
Ducks, Merganser, Hooded	0	0	0	0	0	0	1	0	**1**	**0.1**
Ducks, Teal, Green-winged	0	0	0	0	0	0	0	3	**3**	**0.4**
Ducks, Wood	0	0	0	0	1	2	6	0	**9**	**1.1**
Geese, Brant, Atlantic	0	0	0	0	0	0	1	0	**1**	**0.1**
Geese, Canada	31	27	33	8	96	116	97	180	**588**	**73.5**
Gulls, Great Black-backed	6	0	0	0	0	4	0	9	**19**	**2.4**
Gulls, Herring	6	0	48	4	2	35	23	63	**181**	**22.6**
Gulls, Ring-billed	6	1	0	0	0	3	6	22	**38**	**4.8**
Hawks, Red-tailed	1	0	2	0	0	0	0	1	**4**	**0.5**
Herons, Great Blue	0	0	0	0	0	3	1	7	**11**	**1.4**
Herons, Green	0	0	0	0	0	1	0	0	**1**	**0.1**
Larks, Horned	0	0	0	0	0	10	0	0	**10**	**1.3**
Phoebe, Eastern	0	0	0	4	0	0	0	0	**4**	**0.5**
Ospreys	1	0	0	0	0	0	0	2	**3**	**0.4**
Parakeet, Monk	0	0	0	0	0	0	1	0	**1**	**0.**
Pigeons, Rock	256	110	8	36	50	174	54	36	**724**	**90.5**
Sparrows, House	8	0	0	4	3	2	22	35	**74**	**9.3**
Starlings, European	220	51	13	42	304	54	165	2,034	**2,883**	**360.4**
Swallows, Barn	0	0	0	1	0	2	0	0	**3**	**0.4**
Swallows, Tree	0	0	0	0	0	0	0	2	**2**	**0.3**
Swans, Mute	0	0	0	0	0	4	0	2	**6**	**0.8**
Turkeys, Wild	14	13	12	18	5	8	23	52	**145**	**18.1**
Vultures, Turkey	0	4	0	0	1	3	3	1	**12**	**1.5**

The number of wild turkeys observed along routes surveyed during the BBS has shown an increasing trend since 1966 estimated at 12.0% annually with more recent trends showing an annual increase of 15.1% from 1999 through 2009 (Sauer et al. 2011). The number of turkeys observed in areas surveyed during the CBC has also shown general increasing trends since 1966 (NAS 2010). There were 131

turkeys taken in total by WS at airports in Massachusetts from FY 2003 through FY 2009. The total reported Massachusetts harvest of wild turkeys from the spring 2003 to the spring of 2009 was 17,924 turkeys (MDFW 2010). WS' lethal take of wild turkeys during this period represents 0.7% of the total legal harvest. Given the level of take of this species during the eight-year period, WS has not adversely affected the population in the Commonwealth based on the limited take that has occurred and the increasing population trends.

Table 18 – WS' Total Take of Mammals at Airports in Massachusetts, FY 2002 - FY 2009

Species	Fiscal year								Total Take	Average Annual Take
	2002	2003	2004	2005	2006	2007	2008	2009		
Bats (all)	0	1	0	0	0	0	0	0	**1**	**0.1**
Beavers	10	7	6	10	1	8	13	14	**69**	**8.6**
Cats, Feral	5*	0	0	0	0	0	0	0	**5***	**0.6**
Coyotes	4	7	11	3	3	12	13	22	**75**	**9.4**
Deer, White-tailed	5	4	7	7	8	8	21	23	**83**	**10.4**
Fox, Gray	0	0	1	0	0	0	0	1	**2**	**0.3**
Fox, Red	2	1	0	6	1	3	1	6	**20**	**2.5**
Mice, White-footed	2	0	0	0	0	0	0	2	**4**	**0.5**
Moose	0	0	1	1	0	0	0	0	**2**	**0.3**
Opossums, Virginia	1	0	0	0	0	0	0	0	**1**	**0.1**
Raccoons	1	0	9	0	0	0	0	0	**10**	**1.3**
Skunks, Striped	13	2	0	2	0	7	0	3	**27**	**3.4**
Squirrels, Gray	0	0	0	0	0	2	0	0	**2**	**0.3**
Squirrels, Red	0	0	0	11	0	0	0	0	**11**	**1.4**
Woodchucks	8	56	10	59	30	23	26	65	**277**	**34.6**

* Feral cats live-captured were transported and relinquished to a local animal shelter which accepted responsibility for evaluating their health, fitness for adoption, and final disposition. No lethal take of feral cats occurred in FY 2002.

BBS trend data (Sauer et al. 2011), CBC trend data (NAS 2010), and population estimates from the Partners in Flight Landbird Population Database (Rich et al. 2004) which were derived from several sources are presented in Table 19 for those species that were lethally taken during WS' damage management activities from FY 2002 through FY 2009 in Massachusetts. As shown in Table 19, BBS data reflects trends from 1966 through the 2009 survey, the CBC data reflects trend data from Count Number 67 during 1966-1967 through Count Number 110 during 2009-2010, and the population estimates in Massachusetts which were derived from BBS data based on guidelines published in Rich et al. (2004) except for waterfowl species which were adapted from Klimstra and Padding (2010). Current information on the population status of target mammal species is not available.

The EA concluded that the effects of WS' damage management activities at airports and the surrounding area would not negatively impact those populations of bird and mammal species addressed in the EA when damage management activities occurred within the scope analyzed. WS' lethal take of wildlife species to alleviate damage and threats to human safety were within the estimated level of lethal take analyzed in the EA from FY 2002 through FY 2009, except for take of mourning doves that occurred in FY 2005 and FY 2008 and the lethal take of turkeys in FY 2009. Take occurred above the levels analyzed in the EA but were within limits of the depredation permits issued to WS' or airport authorities by the USFWS pursuant to the Migratory Bird Treaty Act and pursuant to permits issued by the MDFW.

Analyses determined that WS' increased take of mourning doves and turkeys did not adversely affect populations of those species based on the best available information on those species' populations. The

USFWS and the MDFW permitting those activities pursuant to the MBTA provides additional analyses and outside review that WS' activities at airports since FY 2002 have not negatively impacted populations of those birds addressed.

Table 19 – Population data for bird species lethally taken in Massachusetts by WS

Species	MA BBS	Eastern U.S. BBS	U.S. BBS	MA CBC	U.S. CBC	MA Population Estimate
Blackbirds, Red-winged	-1.4%	-1.5%	-0.9%	Decreasing	Decreasing	190,000
Cowbirds, Brown-Headed	-0.6%	-1.7%	-0.5%	Decreasing	Decreasing	190,000
Crows, American	1.0%	0.6%	0.5%	Increasing	Increasing	110,000
Doves, Mourning	1.5%	0.5%	-0.3%	Decreasing	Increasing	260,000
Ducks, American Black	-5.9%	-0.1%	-3.6%	Decreasing	Decreasing	4,785†
Ducks, Mallards	3.0%	-1.3%	1.6%	Increasing	Decreasing	47,001†
Ducks, Merganser, Hooded	N/A*	5.5%	6.8%	Increasing	Increasing	1,256†
Ducks, Teal, Green-winged	N/A	0.1%	-0.4%	Decreasing	Increasing	1,049†
Ducks, Wood	5.5%	1.8%	2.4%	Decreasing	Increasing	24,055†
Geese, Brant, Atlantic	N/A	N/A	N/A	Increasing	Increasing	N/A
Geese, Canada	9.4%	14.4%	10.6%	Increasing	Increasing	29,422†
Gulls, Great Black-backed	0.5%	-1.9%	0.2%	Decreasing	Decreasing	N/A
Gulls, Herring	-8.8%	-2.6%	-3.2%	Decreasing	Decreasing	N/A
Gulls, Ring-billed	-2.8%	5.7%	2.3%	Increasing	Increasing	N/A
Hawks, Red-tailed	2.2%	1.2%	2.0%	Increasing	Increasing	730
Herons, Great Blue	5.2%	1.1%	1.4%	Decreasing	Increasing	N/A
Herons, Green	-2.3%	-1.6%	-1.5%	Increasing	Increasing	N/A
Larks, Horned	N/A	-2.9%	-1.8%	Decreasing	Decreasing	N/A
Phoebe, Eastern	-0.6%	0.3%	1.5%	Increasing	Increasing	95,000
Ospreys	14.9%	3.7%	3.0%	Increasing	Increasing	500
Parakeets, Monk	N/A	N/A	N/A	Increasing	Increasing	N/A
Pigeons, Rock	-3.2%	-0.9%	-1.2%	Increasing	Increasing	50,000
Sparrows, House	-1.9%	-3.7%	-3.7%	Decreasing	Decreasing	170,000
Starlings, European	-5.1%	-1.3%	-0.8%	Decreasing	Decreasing	350,000
Swallows, Barn	-1.4%	-1.8%	-0.4%	N/A	Increasing	61,000
Swallows, Tree	-1.0%	-1.4%	0.4%	Increasing	Decreasing	41,000
Swans, Mute	12.3%	3.9%	3.8%	Increasing	Increasing	N/A
Turkeys, Wild	12.0%	11.2%	8.8%	Increasing	Increasing	6,000
Vultures, Turkey	7.3%	3.6%	2.2%	Increasing	Increasing	700

† Adapted from Klimstra and Padding (2010)

* N/A=Information is unavailable due to timing of surveys and the absence of individuals of those species during surveys in the state or region (*e.g.*, barn swallows do not winter in Massachusetts and therefore, would not appear on the CBC).

WS' damage management activities were site specific, and although local populations of target wildlife species may have been reduced, there was no probable adverse impact on statewide, regional, or national populations of those species from WS' activities from FY 2002 through FY 2009. The potential impacts of program activities on wildlife species have not changed from those analyzed in the EA. All take occurred under a depredation permit or order issued by the USFWS and/or the MDFW, when applicable. Therefore, based on the analyses in the EA of the proposed action alternative and WS' activities being within the scope analyzed in the EA, except for the species stated, WS' activities have not had an adverse impact on wildlife populations in the Commonwealth.

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.[2] To provide the most useful information and a uniform structure for surveillance, strategies for collecting samples could be employed. Those strategies include:

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

Surveillance in Live Wildlife: This strategy involves sampling live-captured, apparently healthy wildlife to detect the presence of a disease. Wildlife species that represent the highest risk of being exposed to, or infected with, the disease because of their movement patterns, or wildlife 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 wildlife 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 wildlife capture and handling.

Surveillance in Harvested Wildlife: Check stations for harvestable mammal species provide an opportunity to sample dead wildlife to determine the presence of a disease, and could supplement data collected during surveillance of live wildlife. Sampling of wildlife harvested or taken as part of damage management activities would focus on species that are most likely to be exposed to a disease.

Under the disease sampling strategies listed above that could be implemented to detect or monitor wildlife diseases in the United States, WS' implementation of those sampling strategies would not adversely affect wildlife populations in the State. Sampling strategies that could be employed involve sampling live-captured wildlife that could be released on site after sampling occurs. The sampling (*e.g.*, drawing blood, hair sample, fecal sample) and the subsequent release of live-captured wildlife would not result in adverse effects since those wildlife are released unharmed on site. In addition, sampling of sick, dying, or harvested wildlife would not result in the additive lethal take of wildlife that would not have already occurred in the absence of a disease sampling program. Therefore, the sampling of wildlife for diseases would not adversely affect the populations of any of the wildlife species addressed in the EA or this supplement to the EA and would not result in any take of wildlife that would not have already occurred in the absence of disease sampling (*e.g.*, hunter harvest).

Analysis of the Availability of Additional Methods to Resolve Threats

As described previously, since the completion of the EA, trap monitors, FLIR devices, and night vision equipment have become available for use while reducing risks of aircraft strikes. Those methods aid in the use of other methods or allow other methods to be applied more selectively and efficiently. Since those methods are components of other methods, there would be no adverse effects on the populations of wildlife from the use of those methods.

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

GonaCon™ is currently registered with the EPA for use to manage local deer populations; however, no products are currently registered for use within the Commonwealth. If GonaCon™ becomes registered for use in the Commonwealth, further evaluation of the use of the product would occur pursuant to the NEPA.

Since the completion of the EA, a product with the reproductive inhibitor known as nicarbazin has been registered for use by the EPA to manage Canada goose and rock pigeon populations by reducing the likelihood that eggs laid by geese and pigeons will hatch. Nicarbazin is a complex of two compounds, 4,4'-dinitrocarbanilide (DNC) and 4,6-dimethyl-2-pyrimidinol (HDP) which interferes with the formation of the vitelline membrane that separates the egg yolk and egg white which prevents the development of an embryo inside the egg (EPA 2005). The active component of nicarbazin is the DNC compound with the HDP compound aiding in absorption of DNC (EPA 2005). Nicarbazin was first developed to treat coccidiosis[3] outbreaks in broiler chickens and has been approved as a veterinary drug by the Food and Drug Administration (FDA) since 1955 for use in chicken feed to prevent the disease coccidiosis (EPA 2005).

Nicarbazin, as a reproductive inhibitor for geese and pigeons, has been registered with the EPA as a pesticide pursuant to the FIFRA under the trade names OvoControl® G and OvoControl® P (Innolytics, LLC, Rancho Sante Fe, CA), respectively.

OvoControl® G (EPA Reg. No. 80224-3) is a restricted use pesticide for reducing the egg hatch of resident Canada geese, domestic mallard ducks, domestic Muscovy ducks and domestic hybrids thereof only in urban areas. The use of OvoControl® G is limited to sites in urban areas, such as office parks, recreational parks, airports, golf courses, schools, hospitals, restaurants, and commercial/industrial sites. The exception is that it may be used at land airports in rural areas, if the airport holds FAA certifications under 14 Code of the Federal Regulations 139.101 and a wildlife hazard management plan under 14 Code of Federal Regulations 139.337. Currently, this formulation is not registered for use in Massachusetts. If a product containing nicarbazin is registered for use in the Commonwealth to manage resident Canada goose population and WS is requested to use the product by a cooperator, the EA would be further reviewed and supplemented to evaluate and analyze to potential impacts to the human environment from the use of the product.

OvoControl® P (EPA Reg. No. 80224-1) has recently been reclassified as an "*unrestricted*" or "*general-use*" pesticide by the EPA. The formulation for pigeons contains 0.5% of the active ingredient nicarbazin by volume as ready-to-use baits for pigeons in urban areas only. Baiting can only occur by applicators licensed by the Commonwealth and only on rooftops or other flat paved or concrete surfaces such as buildings, office parks, malls, hospitals, bridges, airports, tunnels, and commercial sites. This formulation is registered for use in Massachusetts.

Since OvoControl® P is commercially available to both certified and licensed applicators as an unrestricted pesticide, the use of the product could occur under any of the alternatives discussed in the EA and therefore, the effects of the use would be similar across all the alternatives. Under the proposed action, WS could use or recommend nicarbazin under the trade name OvoControl® P as part of an integrated approach to managing damages associated with pigeons. WS' use of nicarbazin under the proposed action would not be additive since the use of the product could occur from other sources, such as private pest management companies or those persons experiencing damage could become a certified or licensed applicator and apply the bait themselves.

[3]Coccidiosis is a pathogen known to infect birds and livestock causing diarrhea, dehydration, and can prevent proper growth of livestock. For more information on coccidiosis, see the EA (USDA 2000).

Population management from the use of reproductive inhibitors occurs through a reduction in the recruitment of new birds into the population by limiting reproductive output. A reduction in the population occurs when the number of birds being recruited into the population cannot replace those individuals that die from other causes each year which equates to a net loss in the number of individuals in the population leading to an overall reduction in the local population. Although not generally considered a lethal method since no direct take occurs, reproductive inhibitors can result in the reduction of a target species' population. WS' use or recommendation of nicarbazin would target local pigeon populations identified as causing damage or threatening human safety. Although a reduction in pigeon populations would likely occur from constant use of nicarbazin, the actual reduction in the population annually would be difficult to derive prior to the initiation of the use of nicarbazin.

One of the difficulties in calculating an actual reduction in a targeted population prior to application of the bait is that consumption of nicarbazin treated bait as currently formulated does not appear to completely eliminate egg hatch in pigeons. Current studies on nicarbazin as a reproductive inhibitor for pigeons has shown variability in hatch rates of pigeons fed treated baits. In addition, pigeons must consume bait treated with nicarbazin daily in the correct dosage throughout the breeding season to achieve the highest level of effectiveness in reducing egg hatch. Pigeons can breed year-around with peak breeding occurring from February through October (Johnston 1992). Giunchi et al. (2007) found that when pigeons were fed treated baits (800 parts per million (ppm)) the number of hatchlings produced declined between 13% and 48% compared to a control group. When pigeons were fed doses of nicarbazin treated bait daily in cage studies at the levels currently found in OvoControl® P (5,000 ppm), Avery et al. (2008) found that the rate of egg hatch was reduced by 59% in captive pigeons. In simulating a 50% reduction in egg hatch, Giunchi et al. (2007) predicted through modeling that a population of 5,000 pigeons would be reduced by half if a 50% reduction in pigeon egg hatch occurred annually over a five-year period. The same population would rebound back to 5,000 individuals within five years if egg hatch returned to normal.

Since the effects of nicarbazin on egg hatch are reversible if no longer provided for consumption (Avery et al. 2006, Giunchi et al. 2007, Avery et al. 2008), the reduction in the local pigeon population from the use of nicarbazin can be maintained at appropriate levels where damages or threats are resolved by increasing or decreasing the amount of nicarbazin treated bait available to target pigeons. Although localized pigeon populations would likely be reduced from the use of nicarbazin, the extent of the reduction would be variable given the uncertainty in effectiveness of nicarbazin to reduce egg hatch in pigeons. When pigeons were provided nicarbazin in cage trials at dosage levels found formulated in OvoControl® P (5,000 ppm), not all eggs laid were infertile with 41% of the eggs producing apparently healthy chicks (Avery et al. 2008).

Label requirements of OvoControl® P restrict the application of the product to urban areas where treated bait can be placed on rooftops or other flat, concrete surfaces which further limits the extent of the products use for reducing pigeon populations. Based on current information, WS' use or recommendation of nicarbazin formulated under the trade name OvoControl® P would not adversely affect pigeon populations in Massachusetts since WS' activities would not be additive to those activities that could occur in the absence of WS' use of the product. The resultant reduction in the pigeon population from the use of nicarbazin would be highly variable given the variability in the effectiveness of the product to reduce egg hatch in pigeons. However, given that the effects of nicarbazin are only temporary if birds are not fed an appropriate dose of nicarbazin daily, the reduction in the population could be fully reversed if treated bait is no longer supplied and other conditions (*e.g.*, food, disease) are favorable for population growth. Any reduction in local pigeon populations could be viewed as benefitting other native wildlife since pigeons can compete with native bird species for food and shelter.

Issue 2 – Effects on non-target species' populations, including T&E species

The issue of non-target species effects, including effects on threatened and endangered species arises from the use of non-lethal and lethal methods identified in the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target wildlife. WS' SOPs are designed to reduce the effects of damage management activities on non-target species' populations which were discussed in WS' programmatic FEIS (USDA 1997) and the EA (USDA 2002). To reduce the risks of adverse effects to non-target wildlife, WS selects damage management methods that are as target-selective as possible or applies such methods in ways that reduces the likelihood of capturing non-target species. Before initiating management activities, WS also selects locations which are extensively used by the target species and employs baits or lures which are preferred by those species. Despite WS' best efforts to minimize non-target take during program activities, the potential for adverse effects to non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Non-lethal methods have the potential to cause adverse effects on 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 target species are also likely to disperse non-targets in the immediate area where the methods are employed. However, 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.

The lethal take of non-targets from using those methods described in the EA is unlikely with take never reaching a magnitude that a negative impact on populations would occur. Any potential non-targets live-captured using non-lethal methods would be handled in such a manner as to ensure the survivability of the animal when released. The use of firearms is selective for target species since animals are identified prior to application; therefore, no adverse impacts are anticipated from use of this method. The use of chemical methods, when used according to label directions, poses minimal hazards to non-target wildlife (USDA 1997).

Non-target Species Analysis from WS' Activities in the Commonwealth, FY 2002 - FY 2009

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 wildlife, the use of such methods can result in the incidental take of unintended species. Those occurrences are minimal and should not affect the overall populations of any species. Since FY 2002, no non-target species were lethally taken during WS' wildlife damage management activities at airports in Massachusetts. WS' take of non-target species during activities to reduce damage or threats to human safety caused by wildlife is expected to continue to be extremely low to non-existent. WS would continue to monitor annually the take of non-target species to ensure program activities or methodologies used in damage management activities do not adversely impact non-targets.

The EA concluded that WS' damage management activities would have no adverse effects on other wildlife species (non-target), including threatened and endangered (T&E) species throughout the Commonwealth when those activities were conducted within the scope analyzed in the EA. Methods used by WS are essentially selective for target species when applied appropriately. In addition, WS adheres to those SOPs discussed in the EA to minimize the potential for non-target take. As discussed previously, the primary methods used during direct operational assistance by WS from FY 2002 through FY 2009 to resolve requests for assistance were non-lethal harassment techniques, shooting with firearms

and air rifles, euthanizing birds and mammals live-captured by hand, in nets, in snap, conibear, decoy or cage traps, and the use of gas cartridges.

Threatened and Endangered Species Analysis

A review of T&E species listed by the USFWS, the National Marine Fisheries Service, and the MDFW showed that no additional listing of T&E species has occurred since the completion of the EA in 2002. The New England cottontail rabbit (*Sylvilagus transitionalis*) and the red knot (*Calidris canutus rufa*) have recently been designated as candidate species for listing in Massachusetts by the USFWS. The USFWS has also recently received petitions for listing of the little brown bat (*Myotis lucifugus*), Northern long-eared bat (*Myotis septentrionalis*), and the small-footed bat (*Myotis leibii*). All three of those bat species along with the tri-colored bat (*Perimyotis subfuscus*) are currently being added to the Massachusetts state list as endangered (T. French, MDFW per. comm. 2011).

WS would continue to monitor both the federal and state lists of T&E species and would consult with the USFWS and the MDFW to ensure future activities at and around airports in the Commonwealth have no effect on newly listed species. The New England cottontail, Myotis bats, and several other state listed species are specifically addressed in the EA.

WS' program activities in Massachusetts to manage damage and threats caused by wildlife at and around airports have not changed from those described in the EA. Thus, WS' determination that wildlife damage management activities at and around airports would have no effect on those species addressed in the EA that were not addressed in the Biological Opinion issued by the USFWS on WS' programmatic activities (USDA 1997) is still valid and appropriate for the proposed action. A review of those species listed in Massachusetts and discussed in the EA that were addressed in the Biological Opinion by the USFWS indicates that WS' wildlife damage management activities at and around airports would continue to have no adverse effects on those species addressed in the Biological Opinion. In addition, WS determined the proposed action alternative would have no effect on those T&E species listed in the Commonwealth that were not addressed in the Biological Opinion, including the use of alpha-chloralose. Program activities and their potential impacts on other wildlife species, including T&E species have not changed from those analyzed in the EA. Impacts of the program on this issue are expected to remain insignificant.

Effects on Non-targets from the Use of those Methods Addressed in the Supplement to the EA

Those additional methods discussed in this supplement to the EA that are available to manage damage associated with wildlife, that have become available since the completion of the EA, allow for methods discussed in the EA to be employed more effectively and to be more target specific.

Night vision equipment and FLIR devices are most often used in association with the use of firearms and are employed to allow activities to be conducted at night. Night vision and FLIR equipment allow for the identification of target species during night activities which reduces the risks to non-targets and reduces human safety risks. Since night vision equipment and FLIR devices only aid in the identification of wildlife and are not actual methods of take, the use of visual aids would not contribute to the take of non-targets. Therefore, the use of night vision and FLIR equipment would have no effect on non-targets.

Trap monitoring devices would be employed when applicable that indicate when a trap has been activated. Trap monitoring devices would allow personnel to prioritize trap checks and decrease the amount of time required to check traps which decreases the amount of time captured non-targets would be restrained. By reducing the amount of time non-targets are restrained, pain and stress can be minimized and non-targets can be addressed in a timely manner, which could allow for non-targets to be released unharmed. Trap monitoring devices would be employed where applicable to facilitate monitoring of the

status of traps in remote locations to ensure any captured wildlife is removed promptly to minimize distress and to increase the likelihood non-targets can be released unharmed.

The use of night vision equipment, FLIR devices, and trap monitors would have no effect on any T&E species listed in Massachusetts, including their designated critical habitats.

The potential adverse effects to non-target wildlife are also a concern from the use of nicarbazin to manage pigeon populations. Exposure of non-target wildlife to nicarbazin could occur either from direct ingestion of the bait by non-target wildlife or from secondary hazards associated with wildlife consuming birds that have eaten treated bait. Several label restrictions of OvoControl® P are intended to mitigate risks to non-target wildlife from direct consumption of treated bait (EPA 2005). Daily observation of bait sites for pigeon and non-target activity must occur during a five to fourteen day acclimation period. The required acclimation period habituates pigeons to feeding in one location at a certain time period. Once pigeons are acclimated and no non-targets are observed feeding on the bait, observations for non-targets must occur once weekly until application of treated bait ends. During the observation periods, the applicator must be present on site until all bait has been consumed. Non-target risks are further minimized by requirements that bait only be placed on rooftops in urban areas and if not practical, baiting is limited to paved and/or on hard concrete surfaces. All unconsumed bait must also be retrieved daily which further reduces threats of non-target consuming treated bait.

In addition, nicarbazin is only effective in reducing the hatch of eggs when blood levels of DNC are sufficiently elevated in a bird species. When consumed by birds, nicarbazin is broken down into the two base components of DNC and HDP which are then rapidly excreted. To maintain the high blood levels required to reduce egg hatch, birds must consume nicarbazin daily at a sufficient dosage that appears to be variable depending on the bird species (Yoder et al. 2005, Avery et al. 2006). For example, to reduce egg hatch in Canada geese, geese must consume nicarbazin at 2,500 ppm compared to 5,000 ppm required to reduce egg hatch in pigeons (Avery et al. 2006, Avery et al. 2008). In pigeons, consuming nicarbazin at a rate that would reduce egg hatch in Canada geese did not reduce the hatchability of eggs in pigeons (Avery et al. 2006). With the rapid excretion of the two components of nicarbazin (DNC and HDP) in birds, non-targets birds would have to consume nicarbazin daily at sufficient doses to reduce the rate of egg hatching.

Secondary hazards also exist from wildlife consuming pigeons that have ingested nicarbazin. As mentioned previously, once consumed, nicarbazin is rapidly broken down into the two base components DNC and HDP. DNC is the component of nicarbazin that limits egg hatchability while HDP only aids in absorption of DNC into the bloodstream. DNC is not readily absorbed into the bloodstream and requires the presence of HDP to aid in absorption of appropriate levels of DNC. Therefore, to pose a secondary hazard to wildlife, ingestion of both DNC and HDP from a pigeon carcass would have to occur and HDP would have to be consumed at a level to allow for absorption of the DNC into the bloodstream. In addition, an appropriate level of DNC and HDP would have to be consumed from a pigeon carcass daily to produce any negative reproductive affects to other wildlife since current evidence indicates a single dose does not limit reproduction. To be effective nicarbazin (both DNC and HDP) must be consumed daily during the duration of the reproductive season to limit the hatchability of eggs. Therefore, to experience the reproductive affects of nicarbazin, a pigeon that had consumed nicarbazin would have to be consumed daily and a high enough level of DNC and HDP would have to be available in the pigeon carcass and consumed for reproduction to be affected. Based on the risks and likelihood of wildlife consuming a treated pigeon daily and receiving the appropriate levels of DNC and HDP daily to negatively impact reproduction, secondary hazards to wildlife from the use of nicarbazin are extremely low (EPA 2005).

Although some risks to other non-target species besides bird species does occur from the use of OvoControl® P, those risks are likely to be minimal given the restrictions on where bait can be applied (*e.g.*, on rooftops, on pavement at airports). Although limited toxicological information for nicarbazin exists for wildlife species besides certain bird species, available toxicology data indicates nicarbazin is relatively non-toxic to other wildlife species (World Health Organization 1998, EPA 2005, California Department of Pesticide Regulation 2007). Given the use restriction of OvoControl® P and the limited locations where bait can be applied, the risks of exposure to non-targets would be extremely low.

WS has reviewed the list of T&E species listed in Massachusetts and determined that the use of nicarbazin under the trade name OvoControl® P would have no effect on those species listed in the Commonwealth. Restricting the use of the product to use on rooftops and paved concrete areas where pigeons are conditioned to feed along with the bait-type (pellets) of the product and the limited availability of the product during application ensures the use of nicarbazin would have no effect on T&E species. WS' would continue to monitor pigeon damage management activities and those species listed in the Commonwealth to ensure compliance with the Endangered Species Act.

Issue 3 – Economic losses to Property

A major concern of the aviation industry is the economic impact of wildlife damage to aircraft and other airport property. The aviation industry is concerned as to whether the proposed action or any of the alternatives would reduce such damage to more acceptable levels.

From FY 2002 to FY 2009, there were 1,014 wildlife strikes reported for airports in Massachusetts to the FAA Wildlife Strike Database. There were 257 strikes with no damage or down time information provided; 443 strikes reporting no damage occurred, and 244 military class E strikes with no dollar figures for damage or down time reported. There were 70 reports indicating damage, aircraft down time, or a dollar figure for damage. Damaging strikes included: 36 minor damage; 14 substantial damage; 15 with damage of an unknown extent; 1 strike with no damage reported indicating 8 hours of aircraft down time; 2 Military Class E strikes with damage costs reported and 2 Military Class C strikes. Military Class C strikes are valued at between $20,000 and $200,000 in damage and Class E Strikes indicate no damage or damage valued at up to $20,000. In total, strikes reported during this period resulted in $2,506,714 in repair costs, $209,218 in other costs, and 4,726 hours with aircraft out of service.

The EA identified three objectives for wildlife damage management conducted by WS at airports in the Commonwealth to reduce economic losses occurring at airports. Those objectives were (1) to reduce damaging wildlife strikes to less than five strikes per year per airport, (2) reduce and maintain wildlife use in hangers to less than $1,000 dollars in damage per year per airport, and (3) to maintain the runways and airfields to no down time caused by wildlife.

The goal of five or fewer damaging strikes was achieved at all airports where WS provided assistance during all years except FY 2004 and FY 2005 when nine and eight damaging strikes were reported at one large metropolitan airport, respectively. No reports of damage figures greater than $1,000 per year per airport were received by WS during the period 2002 to 2009 at airports where WS was conducting operational management projects. No reports of runways or airfields being closed down due to wildlife were reported at Massachusetts airports during periods when WS was conducting operational management projects during the period 2002 to 2009. Therefore, those objectives established in the EA to reduce risks of damaging aircraft strikes at airports where WS has been requested to provide assistance have been achieved, except at one large metropolitan airport where strikes exceed the objective during FY 2004 and FY 2005.

Effects on Non-targets from the Use of those Methods Addressed in the Supplement to the EA

As discussed previously, those mechanical methods available since the completion of the EA would aid in the use of other methods, primarily firearms and traps, which would allow WS to address risks more efficiently and effectively; thereby, further reducing the risks associated with aircraft strikes. Therefore, the economic losses to property could be reduced when those methods are employed to enhance the effectiveness of other methods allowing for threats to be addressed more quickly.

Similarly, the use of nicarbazin to reduce local pigeon populations would likely reduce damage and threats of damage associated with those pigeons; thereby, reducing the amount and severity of economic losses to property.

Issue 4 - Effects on Human Health and Safety

Based on the analyses in the EA (USDA 2002) and WS' programmatic FEIS (USDA 1997), when those activities are conducted according to WS' directives and SOPs, according to federal, Commonwealth, and local laws, and to label requirements, those activities pose minimal risks to human safety (USDA 1997, USDA 2002). The analyses in the EA also concluded that WS' activities to reduce threats and hazards associated with wildlife at and around airports were likely to have positive impacts to human health and safety by addressing safety issues and disease transmission associated with wildlife. The primary positive benefit would be reducing threats associated with wildlife strikes with aircraft. Strikes with wildlife can lead to extensive aircraft damage sometimes resulting in emergency landings or crashes resulting in injury or death of passengers and crew. Remains of struck birds may also puncture windshields or cockpits resulting in loss of cabin pressure, injury or death. Health and safety threats may be caused by accumulations of wildlife feces under roosts or dens in airport structures such as terminals, hangars and jet ways where people work and are likely to encounter feces or surfaces contaminated with feces. Other threats may be reduced as well such as ground vehicle collisions with deer or direct transmission of disease, such as rabies, caused by airport personnel coming into contact with infected wildlife.

The FAA Wildlife Strike Database indicated there were no injuries or fatalities caused by wildlife strikes with aircraft reported in Massachusetts from FY 2002 to FY 2009. WS' activities to reduce or alleviate wildlife threats and damage at and around airports in Massachusetts did not cause any adverse impacts to human health and safety. Program activities and methods, and their potential impacts on human health and safety have not changed from those analyzed in the EA. Impacts of the program on this issue are expected to remain insignificant.

Human Safety Analysis under the Proposed Supplement to the EA

Threats to human safety from the use of OvoControl® P would likely be minimal if labeled directions are followed. The use pattern of OvoControl® P would also ensure threats to public safety are minimal. Label requirements require treated bait to be applied on rooftops of buildings or other areas restricted to public access (*e.g.*, airports). The EPA has characterized OvoControl® P as a moderate eye irritant. The FDA has established a tolerance of nicarbazin residues of 4 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 for a similar product 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 OvoControl® P 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 use of night vision equipment, FLIR equipment, and trap monitors are components employed to aid in the use of other methods. The use of those components would likely reduce risks to human safety associated with the use of other methods. For example, night vision equipment allows the use of firearms at night when human activity is minimal which further reduces risks associated with the use of firearms. Those methods are mechanical and do not involve the actual live-capture or lethal take of wildlife; therefore, the use of those methods in associated with other methods would enhance human safety and would not pose additional threats to human safety.

Issue 5 – Effects on Aesthetics

As described in the EA, WS would employ methods when requested that would result in the dispersal, exclusion, or removal of individuals or small groups of target wildlife species to resolve damage and threats. In some instances where wildlife are dispersed or removed, the ability of interested persons to observe and enjoy that wildlife would likely temporarily decline. However, the wildlife populations in those areas would likely increase upon cessation of damage management activities.

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

The use of lethal methods would result in temporary declines in local populations resulting from the removal of target wildlife species to resolve requests for assistance. WS' goal is to respond to requests for assistance and to manage those birds, mammals or other wildlife responsible for the resulting damage. Therefore, the ability to view and enjoy wildlife in Massachusetts would still remain if a reasonable effort is made to locate wildlife outside the area in which damage management activities occurred.

The EA concluded the effects on aesthetics would be variable depending on the damage situation, stakeholders' values towards wildlife, and their compassion for those who are experiencing damage from wildlife. The WS program in Massachusetts only conducts activities at the request of the affected property owner or resource manager. Upon receiving a request for assistance, WS addresses issues/concerns and explanations are given for the reasons why a particular method or group of methods would be the most effective in reducing damage for the specific situation. Methods employed to reduce or resolve damage is agreed upon by the cooperator according to a cooperative service agreement.

The ability to view and enjoy the aesthetic value of wildlife at a particular site would be somewhat limited if the wildlife was removed as part of an integrated approach to managing damage. However, new wildlife would most likely use the site in the future, although the length of time until this wildlife arrives is variable, depending on the site, time of year, and population densities of wildlife in the surrounding areas. The opportunity to view wildlife is available if a person makes the effort to visit sites outside of the damage management area.

Program activities and methods, and their potential impacts to stakeholders and aesthetics have not changed from those analyzed in the EA. Impacts of the program on this issue are expected to remain insignificant.

Impacts to Aesthetics under the Proposed Supplement to the EA

The use of nicarbazin on the aesthetic values of pigeons occurs primarily from the inability of those

persons interested to enjoy viewing, feeding, and photographing pigeons along with knowing pigeons are free-ranging. The aesthetic value of a local pigeon population would likely lessen from a reduction in a population that would result from the use of nicarbazin. As previously mentioned, the rate of population decline would be variable from the use of nicarbazin since effectiveness of the product varies. However, the rate of decline in a localized pigeon population is likely to occur at a gradual rate compared to other lethal removal programs that target localized pigeon populations. Giunchi et al. (2007) predicted through modeling that a population of 5,000 pigeons would be reduced by half if a 50% reduction in pigeon egg hatch occurred annually over a five-year period. However, damage would continue to occur from those pigeons which could affect the aesthetic value of property and threaten human safety if pigeon populations remain sufficient for extended periods of time. Overall, the aesthetic value of a localized pigeon population would be similar to the use of other lethal methods discussed in the EA since a population decline would occur.

The use patterns of those additional methods addressed in this supplement to the EA would result in the methods being employed more effectively and efficiently. However, those methods would not enhance the success rate of methods to a level where adverse effects would occur to the aesthetic value of wildlife. Wildlife removed using other methods with the aid of night vision equipment, FLIR equipment, or trap monitors would not result in an increase in the number of individuals removed since those individuals would likely have been removed without the aid of those additional methods or other methods would have been employed to remove those target wildlife. The analyses of activities conducted under the proposed action alternative indicate the take of wildlife to reduce risks of aircraft strikes in the Commonwealth has been of a low magnitude when compared to population information and/or harvest data.

Issue 6 - Humaneness and Animal Welfare Concerns of Lethal Methods used by WS

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

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

As mentioned previously, some methods have been stereotyped as "*humane*" or "*inhumane*". However, many "*humane*" methods can be inhumane if not used appropriately. For instance, a cage trap is generally considered by most members of the public as "*humane*". Yet, without proper care, live-captured wildlife in a cage trap can be treated inhumanely if not attended to appropriately.

Therefore, WS' mission is to effectively address requests for assistance using methods in the most humane way possible that minimizes the stress and pain of the animal. WS' personnel are experienced

and professional in their use of management methods, and methods are applied as humanely as possible. Methods used in wildlife damage management activities in Massachusetts since the completion of the EA and their potential impacts on humaneness and animal welfare have not changed from those analyzed in the EA. Therefore, the analyses of the humaneness of methods used by WS to threats of aircraft strikes from FY 2002 through FY 2009 have not changed from those analyzed in the EA.

Humaneness Analysis under the Proposed Supplement to the EA

The use of nicarbazin would generally be considered as a humane method of managing local populations of pigeons. Nicarbazin reduces the hatchability of eggs laid by pigeons and appears to have no adverse effects on pigeons consuming bait daily and does not appear to adversely affect those chicks that do hatch from parents fed nicarbazin (Avery et al. 2006, Avery et al. 2008). Nicarbazin has been characterized as a veterinary drug since 1955 by the FDA for use in broiler chickens to treat outbreaks of coccidiosis with no apparent ill effects to chickens. Based on current information, the use of nicarbazin would generally be considered humane based on current research.

The use of night vision equipment, FLIR equipment, and trap monitors would enhance the humaneness of other methods by allowing those methods to be used more effectively and more efficiently. Those additional methods are not methods used to directly live-capture or lethally remove wildlife.

XIV. CUMULATIVE IMPACTS

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts to the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

WS' wildlife damage management activities would be the primary federal program with damage management responsibilities; however, other entities may conduct similar activities in Massachusetts as permitted by the USFWS and the MDFW. Through ongoing coordination with the USFWS and the MDFW, WS is aware of such activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with other entities in the same area, but may conduct activities at adjacent sites within the same timeframe. The potential cumulative impacts analyzed below could occur either as a result of WS' program activities over time or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Chapter 4 of the EA provides further information and analyses on potential cumulative impacts of the proposed action. The following resource values in the Commonwealth are not expected to be significantly impacted from cumulative activities conducted pursuant to any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, critical habitats (areas listed in T&E species recovery plans), visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. Those resources will not be analyzed further. The activities proposed in the alternatives would have a negligible cumulative 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 alternatives. Those alternatives would meet the requirements of applicable laws, regulations, and Executive Orders including the Clean Air Act and Executive Order 13514.

Issue 1 - Effects on target wildlife species populations

Evaluation of WS' activities relative to wildlife populations indicated that program activities would likely have no cumulative adverse effects on populations in Massachusetts. WS' 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: (1) natural mortality of wildlife, (2) mortality of wildlife from vehicle collisions, aircraft strikes, and illegal take, (3) human-induced mortality through private damage management activities, (4) human and naturally induced alterations of wildlife habitat, and (5) 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. WS' actions taken to minimize or eliminate damage are constrained as to scope, duration and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS 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, USDA 1997). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species.

With management authority over wildlife populations, the USFWS and the MDFW can adjust take levels, including the take by WS, to ensure population objectives for specific wildlife species are achieved. Consultation and reporting of take by WS would ensure the USFWS and the MDFW considers any activities conducted by WS.

WS' take of wildlife in the Commonwealth from FY 2002 through FY 2009 was of a low magnitude when compared to available information. The USFWS and the MDFW considers all known take when determining population objectives for wildlife and can adjust the number that can be taken during the regulated hunting/trappings seasons and the number of wildlife taken for damage management purposes to achieve the population objectives. Any take by WS would occur at the discretion of the USFWS and the MDFW. Any wildlife population declines or increases would be the collective objective for those species' populations established by the USFWS and the MDFW through the regulation of take. Therefore, the cumulative take of wildlife annually or over time by WS would occur at the desire of the USFWS and the MDFW as part of management objectives for wildlife in the Commonwealth.

No cumulative adverse impacts on wildlife populations are expected from WS' actions based on the following considerations:

Historical outcomes of WS' activities to address wildlife threats at airports in the Commonwealth

No cumulative adverse effects have been identified for wildlife as a result of program activities implemented over time based on analyses contained in the EA, from annual monitoring reports, or from analyses contained in the proposed supplement. WS continues to implement an integrated damage management program that adapts to the damage situation and the species involved with causing the damage. WS only targets wildlife causing damage and only after a request for assistance is received. All program activities are coordinated with appropriate federal, Commonwealth, and local entities to ensure WS' activities do not adversely impact the populations of any native wildlife species.

WS continues to implement an integrated program that employs primarily non-lethal dispersal and harassment methods. WS would continue to provide technical assistance to those persons requesting assistance to identify and alleviate damage.

SOPs built into WS' program

SOPs are designed to reduce the potential negative effects of WS' actions on wildlife, and are tailored to respond to changes in wildlife populations which could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alterations in program activities are defined through SOPs and implementation is insured through monitoring, in accordance with WS' Decision Model (Slate et al. 1992, USDA 1997).

Migratory Bird Treaty Act, as amended

The Migratory Bird Treaty Act, as amended, places the protection of all bird species designated under the Act under the management authority of the USFWS. All take for damage management purposes is authorized by permit or order pursuant to the Act issued by the USFWS. Oversight of the allowed take of bird species by the USFWS ensures cumulative impacts are considered and addressed when determining the allowable take of bird species to ensure the viability of a population. The allowed take, including cumulative take, is analyzed and determine by the USFWS prior to the issuance of permits under the Act. Therefore, WS' allowed take, as authorized by the USFWS by permit, should not reach a level where cumulative take would adversely impact bird populations.

Issue 2 – Effects on non-target species' populations, including T&E species

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

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

The use of firearms and euthanasia methods are essentially selective for target species since identification of an individual is made prior to the application of the method. Euthanasia methods are applied through

direct application to target wildlife. Therefore, the use of those methods would not impact non-target species.

Chemical methods available for use under the proposed action are repellents, nicarbazin, DRC-1339, zinc phosphide, warfarin, diphacinone, gas cartridges, and alpha-chloralose which are described in Appendix B of the EA (USDA 2002). Except for repellents that are applied directly to the affected resource and gas cartridges, all chemical methods are employed using baits that are highly attractive to target species and used in areas where exposure to non-targets are minimal. Many of those methods require an acclimation period and monitoring of potential bait sites for non-target activity. All chemicals would be used according to product label which ensures that proper use would minimize non-target threats. WS' adherence to Directives and SOPs governing the use of chemicals also ensures non-target hazards are minimal. Gas cartridges were the only chemical method employed by WS to reduce risks associated aircraft strikes from FY 2002 through FY 2009. Gas cartridges contain sodium nitrate which when ignited produces carbon monoxide gas. Sodium nitrate is a naturally occurring substance (EPA 1991). When used as a fumigant, the carbon monoxide gas produced from igniting the sodium nitrate dissipates into the atmosphere and is diluted into the air (EPA 1991). Some dissipation of carbon monoxide gas into the soil also likely occurs. Given the use patterns of gas cartridges, the likelihood of leaching of sodium nitrate or carbon monoxide into ground water is minimal.

All chemical methods would be tracked and recorded to ensure proper accounting of used and unused chemicals occurs. All chemicals would be stored and transported according the WS and Department of Transportation regulations. The amount of chemicals used or stored by WS would be minimal to ensure human safety. Based on this information, WS' use of chemical methods, as part of the proposed action, would not have cumulative impacts on non-targets.

The methods described in Appendix B of the EA all have a high level of selectivity and can be employed using SOPs to ensure minimal impacts to non-targets species. No non-targets were taken by WS during management activities from FY 2002 through FY 2009. Based on the methods available to wildlife strike 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 has not and would not cumulatively impact non-target species. Cumulative impacts would be minimal on non-targets from any of the alternatives discussed**.**

Issue 3 – Economic losses to Property

WS' activities since FY 2002 have been conducted to reduce the economic losses to property associated with aircraft striking wildlife at airports within the Commonwealth. Aircraft striking wildlife can sustain sever damage requiring extensive repairs and being taken out of service. Strikes can also lead to the destruction of planes and threaten passenger safety if a strike causes a catastrophic failure of the aircraft leading to a crash.

One of the objectives established by WS was to reduce damaging wildlife strikes to less than five strikes per year per airport. In most instances, WS has achieved that objective since FY 2002 at those airports where assistance is provided. By reducing the likelihood of a wildlife strike, WS can reduce the potential for damage strikes to occur.

No damage to property occurred from WS' activities conducted from FY 2002 through FY 2009. WS' activities targeted those wildlife identified as posing a threat of an aircraft strike at airports within the Commonwealth. No cumulative impacts associated with this issue have been identified since the Decision for the EA was signed.

Issue 4 - Effects on Human Health and Safety

Non-Chemical Methods

All non-chemical methods described in Appendix B of the EA are used within a limited time frame, are not residual, and do not possess properties capable of inducing cumulative adverse impacts on human health and safety. All non-chemical methods are used after careful consideration of the safety of those employing methods and to the public. All capture methods are employed where human activity is minimal and warning signs are placed in conspicuous areas, when appropriate, to ensure the safety of the public. Capture methods also require direct contact to trigger ensuring that those methods, when left undisturbed would have no effect on human safety. All methods are agreed upon by the requesting entities which are made aware of the safety issues of those methods when entering into a MOU, cooperative service agreement, or other comparable document between WS and the cooperating entity. SOPs also ensure the safety of the public from those methods used to capture or take wildlife. A formal risk assessment conducted by APHIS determined that WS' non-chemical methods, when used as intended, pose a low risk to human safety (USDA 1997). Firearms used to alleviate or prevent damage, though hazards do exist, are employed to ensure the safety of personnel and the public.

WS has received no reports or documented any adverse effects to human safety from management activities conducted from FY 2002 through FY 2009. Personnel employing non-chemical methods would continue to be trained to be proficient in the use of those methods to ensure safety of the applicator and to the public. Based on the use patterns of non-chemical methods, those methods would not cumulatively impact human safety.

Questions have arisen about the deposition of lead into the environment from ammunition used in firearms to lethally remove mammals. As described in Appendix B of the EA, the lethal removal of wildlife species 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). Hunt et al. (2009) also found that deer killed with rifles using lead bullets may pose a risk of lead exposure to scavengers from ingestion of lead fragments in the carcass.

To reduce risks to human safety and property damage from bullets passing through mammal species, the use of firearms is applied in such a way (*e.g.*, caliber, bullet weight, distance) to ensure the bullet does not pass through. When using firearms, the retrieval of carcasses for proper disposal is highly likely. With risks of lead exposure occurring primarily from ingestion of shot and bullet fragments, the retrieval and proper disposal of carcasses would greatly reduce the risk of scavengers ingesting or being exposed to lead.

However, deposition of lead into soil could occur if, during the use of firearms, the projectile(s) pass through, if misses occur, or if the carcass is not retrieved. In general, hunting tends to spread lead over wide areas and at low concentrations (Craig et al. 1999). 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, other concerns are that lead from bullets or shot deposited in soil from shooting activities could lead to contamination of water, 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*", 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 where it was believed the lead contamination was due to runoff from the parking 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 the 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 naturally 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 wildlife threats using firearms, as well as most other forms of dry land small game hunting in general, lead contamination of water from such sources would be minimal to nonexistent.

Since permits can be issued by the MDFW directly to entities experiencing damage or threats of damage, WS' assistance with removing target wildlife species would not be additive to the environmental status quo since those mammals removed by WS using firearms could be lethally removed by the entities receiving the depredation permit 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 reducing threats of aircraft strikes due to efforts by WS to ensure projectiles do no pass through, but are contained within, the wildlife 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 mammals are lethally removed in a humane manner 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 carcasses would be retrieved and disposed of properly to limit the availability of lead in the environment and ensures carcasses are removed from the environment to prevent the ingestion of lead by scavengers. Based on current information, the risks associated with lead bullets or shot that are deposited into the environment from WS' activities due to misses, the bullet or shot passing through the carcass, or from carcasses that may be irretrievable, would be below any level that would pose any risk from exposure or significant contamination of water.

Chemical Methods

Chemical methods available for use under the proposed action are described in Appendix B of the EA (USDA 2002). No adverse effects have been reported to or identified by WS from the use of chemical methods while reducing threats of aircraft strikes conducted by WS from FY 2002 through FY 2009. When chemical methods are applied as intended and when safety guidelines are followed, no adverse effects to human safety are expected. The primary risk of exposure to chemical methods occurs to handlers and applicators. WS' personnel who use and apply chemical methods would be trained according to federal, Commonwealth, and local laws and regulations, including WS' directives. Based on this information, the use of chemical methods as part of the proposed action by WS would not have cumulative impacts on human safety.

Issue 5 – Effects on Aesthetics

The activities of WS would result in the removal of those target wildlife species from those areas where threats of aircraft strikes occur. Therefore, the aesthetic value of those individuals removed in those areas where damage management activities were being conducted would be reduced.

Some people experience a decrease in aesthetic enjoyment of wildlife because they feel that overabundant species are objectionable and interfere with their enjoyment of wildlife in general. Continued increases in numbers of individuals or the continued presence of those species may lead to further degradation of some people's enjoyment of any wildlife or the natural environment. The actions of WS could positively affect the aesthetic enjoyment of wildlife for those people that are being adversely affected by the target species identified in this EA.

Bird population objectives are established and enforced by the USFWS and the MDFW after consideration of all known mortality factors. The MDFW also has management authority over mammalian wildlife in the Commonwealth. Therefore, WS has no direct impact on the status of wildlife populations since all take by WS occurs at the discretion of the USFWS and/or the MDFW. Since those persons seeking assistance could remove those wildlife species identified as posing a threat without WS' direct involvement, WS' involvement would have no effect of the aesthetic value of wildlife in the area where damage was occurring. When threats occur, any removal of wildlife by the airport authority would likely occur whether WS was involved with reducing threats 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.

Issue 6 - Humaneness and Animal Welfare Concerns of Lethal Methods used by WS

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

All methods not requiring direct supervision during employment (*e.g.*, live traps) would be checked and monitored to ensure any wildlife confined or restrained are addressed in a timely manner to minimize distress of the animal. All euthanasia methods used for live-captured wildlife would be applied according to AVMA guidelines for free-ranging wildlife. Shooting would occur in limited situations and personnel would be trained in the proper use of firearms to minimize pain and suffering of birds taken by this method.

WS employs methods as humanely as possible by applying measures to minimize pain and that allow wildlife captured to be addressed in a timely manner to minimize distress. Through the establishment of SOPs that guide WS in the use of methods to address damage and threats associated with wildlife in the Commonwealth, the cumulative impacts on the issue of method humaneness are minimal. All methods would be evaluated annually to ensure SOPs are adequate to ensure those methods continue to be used to minimize suffering and that wildlife captured are addressed in a timely manner to minimize distress.

XV. SUMMARY OF CUMULATIVE IMPACTS

No significant cumulative environmental impacts are expected from activities considered under the supplement to the EA. Likewise, no significant cumulative impacts have been identified from the implementation of the proposed action in the EA since FY 2002. Under the proposed action, the

reduction of wildlife damage or threats using an integrated approach employing both non-lethal and lethal methods would not have significant impacts on wildlife populations in Massachusetts or nationwide. WS continues to coordinate activities with federal, Commonwealth, and local entities to ensure activities do not adversely impact wildlife populations. No risk to public safety is expected when WS' activities are conducted pursuant to the proposed action or the proposed supplement to the EA. The EA further describes and addresses cumulative impacts from the alternatives, including the proposed action.

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