SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT: REDUCING BIRD DAMAGE THROUGH AN INTEGRATED WILDLIFE DAMAGE MANAGEMENT PROGRAM IN THE STATE OF NORTH CAROLINA

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

October 2013

PURPOSE

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 damage and threats of damage caused by birds in North Carolina (USDA 2010). The EA evaluated the need for damage management and the relative effectiveness of three alternatives to meet that proposed need, while accounting for the potential environmental effects of those activities. WS' proposed action in the EA implements an integrated damage management program in North Carolina to address the need for resolving damage caused by birds.

Bird species addressed in the EA include double-crested cormorants (*Phalacrocorax auritus*), great blue herons (*Ardea herodias*), great egrets (*Ardea alba*), little blue herons (*Egretta caerulea*), cattle egrets (*Bubulcus ibis*), green herons (*Butorides virescens*), black-crowned night-herons (*Nycticorax nycticorax*), white ibis (*Eudocimus albus*), black vultures (*Coragyps atratus*), turkey vultures (*Cathartes aura*), Atlantic brants (*Branta bernicla hrota*), mute swans (*Cygnus olor*), feral geese, feral ducks, wood ducks (*Aix sponsa*), American wigeons (*Anas americana*), American black ducks (*Anas rubripes*), mallards (domestic/wild) (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), Northern shovelers (*Anas clypeata*), Northern pintails (*Anas acuta*), green-winged teal (*Anas crecca*), canvasbacks (*Aythya valisineria*), lesser scaup (*Aythya affinis*), greater scaup (*Aythya marila*), hooded mergansers (*Lophodytes cucullatus*), common mergansers (*Mergus merganser*), ruddy ducks (*Oxyura jamaicensis*), osprey (*Pandion haliaetus*), bald eagles (*Haliaeetus leucocephalus*), Northern harriers (*Circus cyaneus*), sharp-shinned hawks (*Accipiter striatus*), Cooper's hawks (*Accipiter cooperii*), red-shouldered hawks (*Buteo lineatus*), red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), peregrine falcons (*Falco peregrinus*), ring-necked pheasants (*Phasianus colchicus*), wild turkeys (*Meleagris gallopavo*), American coots (*Fulica americana*), killdeer (*Charadrius vociferous*), black-bellied plovers (*Pluvialis squatarola*), semipalmated plovers (*Charadrius semipalmatus*), greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs (*Tringa flavipes*), spotted sandpipers (*Actitis macularia*), solitary sandpipers (*Tringa solitaria*), semipalmated sandpipers (*Calidris pusilla*), Western sandpipers (*Calidris mauri*), least sandpipers (*Calidris minutilla*), pectoral sandpipers (*Calidris melantos*), buff-breasted sandpipers (*Tryngites suberficllis*), Wilson's snipe (*Gallinago delicata*)[1], laughing gulls (*Leucophaeus atricilla*)[2], ring-billed gulls (*Larus delawarensis*), herring gulls (*Larus argentatus*), lesser black-backed gulls (*Larus fuscus*), great black-backed gulls (*Larus marinus*), royal terns (*Sterna maxima*), common terns (*Sterna hirundo*), mourning doves (*Zenaida macroura*), great horned owls (*Bubo virginianus*), barred owls (*Strix varia*), common nighthawks (*Chordeiles minor*), chimney swifts (*Chaetura pelagica*), belted kingfishers

[1]The Wilson's snipe was previously a subspecies of the common snipe (*Gallinago gallinago*); however, due to recent taxonomical studies, the former subspecies was determined to be a distinct species (Mueller 1999). The use of common snipe in the EA and the use of Wilson's snipe in the supplement to the EA are synonymous and refer to the snipe found in North Carolina.
[2]Due to recent classification studies, the laughing gull is now in the genus *Leucophaeus* (Burger 1996).

(*Megaceryle alcyon*), downy woodpeckers (*Picoides pubescens*), hairy woodpeckers (*Picoides villosus*), Northern flickers (*Colaptes auratus*), loggerhead shrikes (*Lanius ludovicianus*), blue jays (*Cyanocitta cristata*), American crows (*Corvus brachyrhynchos*), fish crows (*Corvus ossifragus*), horned larks (*Eremophila alpestris*), tree swallows (*Tachycineta bicolor*), Northern rough-winged swallows (*Stelgidopteryx serripennis*), bank swallows (*Riparia riparia*), cliff swallows (*Petrochelidon pyrrhonota*)[3], barn swallows (*Hirundo rustica*), American robins (*Turdus migratorius*), gray catbirds (*Durnetella carolinensis*), Northern mockingbirds (*Mimus polyglottos*), Northern cardinals (*Cardinalis cardinalis*), red-winged blackbirds (*Agelaius phoeniceus*), Eastern meadowlarks (*Sturnella magna*), common grackles (*Quiscalus quiscula*), boat-tailed grackles (*Quiscalus major*), brown-headed cowbirds (*Molothrus ater*), purple finches (*Carpodacus purpureus*), and house finches (*Haemorhous mexicanus*)[4].

WS reviewed comments from the public involvement process for substantive issues and alternatives, which WS considered during the development of the Decision for the EA. After consideration of the analysis contained in the EA and review of public comments, WS issued a Decision and Finding of No Significant Impact (FONSI) for the EA on November 23, 2010. The Decision and FONSI selected the proposed action alternative to implement an integrated damage management program potentially using multiple methods to address the need for bird damage management.

The purpose of the EA will remain as addressed in Section 1.1 of the EA (USDA 2010). This supplement to the EA examines potential environmental impacts of proposed activities as those activities relate to an increase in the number of requests for assistance to manage bird damage and threats in North Carolina, especially those threats associated with bird species being struck by aircraft at airports and military bases. In addition, this supplement will evaluate new data that has become available from research findings and data gathering since the issuance of the Decision and FONSI in 2010. The analyses will also consider WS' activities to alleviate bird damage in North Carolina since the 2010 Decision and FONSI was issued to ensure program activities remain within the impact parameters analyzed in the EA.

NEED FOR ACTION

Section 1.2 of the EA describes the need for action associated with damage and threats of damage caused by birds in North Carolina (USDA 2010). The need for action addressed in the EA remains applicable to this supplement to the EA. The need for action to manage damage and threats associated with birds in North Carolina arises from requests for assistance[5] received by WS to reduce and prevent damage from occurring to agricultural resources, natural resources, and property, along with threats to human safety.

Since federal fiscal year (FY)[6] 2010, WS has conducted 200 technical assistance projects in North Carolina that addressed damage and threats of damage associated with birds (see Table 1). WS provides technical assistance by providing information and recommendations on activities that people requesting assistance could conduct themselves without WS' direct involvement in managing or preventing the damage. The technical assistance projects conducted by WS are representative of the damage and threats that birds cause in North Carolina. Chapter 3 of the EA further describes WS' technical assistance activities (USDA 2010). Technical assistance projects do not include projects involving direct operational assistance provided by WS in which people request WS to provide direct assistance with

[3]The cliff swallow is included in the genus *Petrochleidon*; the EA incorrectly listed the cliff swallow within the genus *Hirundo*.

[4]The genus of the house finch changed from *Carpodacus* to the genus *Haemorhous* in 2012 (LeGrand et al 2013).

[5]WS would only conduct damage management activities after receiving a request for assistance. Before initiating activities, WS and the cooperating entity must sign a Memorandum of Understanding, cooperative service agreement, or other comparable document that would list all the methods the property owner or manager would allow WS to use on property they own and/or manage.

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

managing damage or threats of damage. Chapter 3 of the EA also discusses direct operational assistance that WS could provide when requested (USDA 2010).

WS has conducted 105 technical assistance projects involving damage or threats of damage associated with turkey vultures and black vultures since FY 2010, which are the two bird species with the highest number of projects conducted. Vultures often roost in mixed species flocks in large numbers. Fecal droppings often accumulate under areas where vultures roost and loaf. People often raise concerns about disease transmission from accumulations of fecal droppings on their property. The odor and aesthetically displeasing presence of fecal droppings at roost sites can also be a concern. Damage can also occur to property from vultures pulling and tearing shingles, trim, and rubber material on buildings and vehicles.

Table 1 – Technical assistance projects conducted by WS in North Carolina, FY 2010 – FY 2012

Species	Projects	Species	Projects
Brant	1	**Red-tailed Hawk**	4
Mute Swan	1	**Killdeer**	2
Feral Goose	8	**Laughing Gull**	6
Feral Duck	2	**Ring-Billed Gull**	7
Mallard	3	**Herring Gull**	7
Wild Turkey	1	**Great Black-backed Gull**	3
Double-crested Cormorant	4	**Mourning Dove**	5
Brown Pelican	1	**Great Horned Owl**	1
Great Blue Heron	6	**Barred Owl**	2
Great Egret	5	**Downy Woodpecker**	4
Black Vulture	68	**Northern Flicker**	4
Turkey Vulture	37	**American Crow**	4
Osprey	2	**Barn Swallow**	3
Bald Eagle	3	**Northern Mockingbird**	1
Cooper's Hawk	1	**Blackbirds (mixed)**	3
Red-shouldered Hawk	1	**TOTAL**	**200**

Vultures can also cause injuries and death to newborn lambs and calves during the birth of the animals. Vultures often attack the soft tissue areas of newborns as the female delivers the newborn. During the birthing process, newborns and mothers are vulnerable and often unable to prevent attacks by large groups of vultures. Vultures often attack the eyes and rectal area of newborns during delivery, which can result in serious injury to the lamb or calf and often leads to the death of the animal.

During requests for assistance received by WS, cooperators often report to WS or WS verifies through site visits, damage associated with various species of birds in the State. Since FY 2010, WS has received reports of damage or WS has verified $58,000 in damages caused by birds in the State (see Table 2), excluding damage caused by Canada geese.

Table 2 – Reported or verified monetary damage by resource caused by birds in North Carolina

Resource Type	Damage by Fiscal Year			Total
	2010	2011	2012	
Property	$20,000	$14,500	$4,500	**$39,000**
Agriculture	$12,000	$6,000	$0	**$18,000**
Natural Resources	$0	$0	$0	**$0**
Human Safety	$0	$0	$1,000	**$1,000**
TOTAL	**$32,000**	**$20,500**	**$5,500**	**$58,000**

WS has received reports or verified damages occurring primarily to property and agricultural resources. WS has received reports of or verified nearly $39,000 in damages to property in the State since FY 2010 with $18,000 in damages to agricultural resources. Table 2 reflects damage based on requests received by WS for assistance and reflects only damage that WS received reports of or a WS' employee verified; therefore, the damage reported in Table 2 is not reflective of all bird damage occurring in the State since WS does not receive reports all bird damage or threats. Assigning monetary damage to natural resources can be difficult especially when factoring in the lost aesthetic value when birds damage natural resources. Similarly, placing a monetary value on threats to human safety can be difficult.

Addressing Increasing Requests for Assistance Received by WS in North Carolina

The EA served as a decision-aiding mechanism, which infused the policies and goals of the National Environmental Policy Act (NEPA) into the actions of WS. Preparing the EA assisted in determining if the proposed cumulative management of bird damage could have a significant impact on the environment based on previous activities conducted and based on the anticipation of conducting additional efforts to manage damage. Because the goal of WS would be to conduct a coordinated program to alleviate bird damage in accordance with plans, goals, and objectives developed to reduce damage, and because the program's goals and directives[7] would be to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts could occur. Thus, the EA anticipated those additional efforts. Therefore, the intent of the analyses in the EA was to evaluate actions that could occur in any locale and at any time within North Carolina as part of a coordinated program. As a basis for WS' additional efforts, the EA analyzed activities conducted by WS from FY 2004 through FY 2009. However, since the issuance of the Decision for the EA, monitoring activities conducted by WS have shown that activities and requests for assistance associated with several bird species has increased above the parameters evaluated in the EA. Therefore, activities associated with those species warrant further analysis pursuant to the NEPA.

Many of the avian species addressed in the EA and this supplement are gregarious (*i.e*., form large flocks) species especially during the fall and spring migration periods. Although damage and threats can occur throughout the year, requests for assistance 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 occur 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 were ingested into aircraft engines. Since the completion of the EA, the number of requests for assistance has increased or WS anticipates receiving increasing requests for assistance associated with damage caused by mourning doves, killdeer, ring-billed gulls, herring gulls, great black-backed gulls, brown-headed cowbirds, common grackles, house finches, Northern mockingbirds, and turkey vultures, primarily at airports within the State. In addition, WS has received requests for assistance to alleviate damage associated with buffleheads (*Bucephala albeola*), red-breasted mergansers (*Mergus serrator*), Northern bobwhites (*Colinus virginianus*), pied-billed grebes (*Podilymbus podiceps*), brown pelicans (*Pelecanus occidentalis*), American bitterns (*Botaurus lentiginosus*), snowy egrets (*Egretta thula*), Mississippi kites (*Ictinia mississippiensis*), sandhill cranes (*Grus canadensis*), upland sandpipers (*Bartramia longicauda*), ruddy turnstones (*Arenaria interpres*), sanderlings (*Calidris alba*), Bonaparte's gulls (*Chroicocephalus philadelphia*), least terns (*Sternula antillarum*), Forster's terns (*Sterna forsteri*), sandwich terns (*Thalasseus sandvicensis*), merlins (*Falco columbarius*), Eastern kingbirds (*Tyrannus*

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

tyrannus), Eastern bluebirds (*Sialia sialis*), and brown thrashers (*Toxostoma rufum*) in the State since the completion of the EA. Requests for assistance associated with those species are associated with damages and threats of damages occurring at airports in the State. Those bird species can present a safety threat to aviation when they occur in large flocks on or near airport property or when they attempt to build nests on or inside aircraft.

From 1990 through 2012, the Federal Aviation Administration (FAA) or air carriers in the United States received reports of 127,212 bird strikes (Dolbeer et al. 2013). The number of actual bird strikes is likely to be much greater since an estimated 80% of civil bird strikes may go unreported (Linnell et al. 1999, Cleary et al. 2005, Wright and Dolbeer 2005). Between 2004 and 2008, Dolbeer (2009) estimated the FAA received reports on only 39% of the actual aircraft strikes; therefore, 61% of aircraft strikes went unreported. Birds struck by aircraft can cause substantial damage to the aircraft. In total, aircraft strikes involving birds resulted in 517,391 hours of aircraft downtime and nearly $577.5 million in reported damages to civil aircraft since 1990 in the United States (Dolbeer et al. 2013). Of the reported wildlife strikes occurring in North Carolina between 1990 and 2010, 1,744 aircraft strikes have involved birds (Dolbeer et al. 2012). Bird strikes can cause catastrophic failure of aircraft systems (*e.g.*, ingesting birds into engines), which can cause the plane to become uncontrollable leading to crashes. Since 1988, more than 250 people worldwide have died in aircraft that have crashed after striking wildlife (Dolbeer et al. 2013). Between 1990 and 2012, 23 people have died after aircraft have struck birds in the United States (Dolbeer et al. 2013). Injuries can also occur to pilots and passengers from bird strikes. Bird strikes between 1990 and 2012 have caused at least 240 reported injuries to passengers and pilots in the United States (Dolbeer et al. 2013).

The need to address an increasing number of mourning doves, killdeer, ring-billed gulls, herring gulls, great black-backed gulls, common grackles, brown-headed cowbirds, house finches, Northern mockingbirds, and turkey vultures is based on an increasing number of requests for assistance received by WS associated with those species. As part of those requests for assistance, WS reasonably anticipates the number of individuals of each species addressed annually by WS to alleviate damage will also increase. In addition, WS has received requests to address buffleheads, red-breasted mergansers, Northern bobwhites, pied-billed grebes, brown pelicans, American bitterns, snowy egrets, Mississippi kites, sandhill cranes, upland sandpipers, ruddy turnstones, sanderlings, Bonaparte's gulls, least terns, Forster's terns, sandwich terns, merlin, eastern kingbirds, eastern bluebirds, and brown thrashers, which were not specifically addressed in the EA. To assist with communicating to the public the individual and cumulative impacts associated with managing damage and threats associated with those species in North Carolina, WS is preparing this supplement to the EA. Information regarding the need for action to manage damage associated with those species occurs in the follows sections.

Need to Address Additional Requests for Assistance Associated with Brown Pelicans

Since the completion of the EA, an increase in brown pelican activity has occurred due to seasonal increases in baitfish at ponds and drainage ditches near eastern airports in North Carolina. Brown pelicans are highly social during all seasons and they often nest, roost, fly, and forage in groups (Shields 2002). This gregarious behavior and their large size can increase aircraft strike risks at airports within the State. In 1994, a privately owned aircraft in Florida struck at least one brown pelican during flight causing the aircraft to crash, which resulted in the death of the pilot. Across the United States, brown pelicans have been involved with 59 reported aircraft strikes between 1990 and 2012, with 25 strikes reporting damage to the aircraft and 21 reporting the strike had a negative effect on the flight (Dolbeer et al. 2013). Aircraft strikes involving brown pelicans resulted in 496 reported hours of aircraft downtime and over $462,500 in damages (Dolbeer et al. 2013). In a ranking of wildlife species involved with aircraft strikes in the United States between 1990 and 2012, Dolbeer et al. (2013) ranked brown pelicans as the sixth most hazardous wildlife species based on the percentage of strikes causing damage and

percentage of strikes having a negative effect on the flight. Most requests for assistance received by WS involving brown pelicans are associated with aircraft strike risks.

The brown pelican is a coastal marine species with breeding and wintering populations occurring in North Carolina (Shields 2002). Due to their large size, slow flight pattern, and flocking behavior, brown pelicans can pose risks of aircraft strikes in areas where airfields are located next to marine environments.

Need to Address Additional Requests for Assistance Associated with Turkey Vultures

WS continues to receive requests for assistance associated with turkey vultures. Turkey vultures often roost in large numbers, sometimes roosting in mixed species flocks with black vultures. Fecal droppings often accumulate under areas where vultures roost and loaf. People requesting assistance from WS often express their concerns about disease transmission to people that encounter fecal droppings on their property. The odor and aesthetically displeasing presence of fecal droppings at roost sites can also be a concern. Damage can also occur to property from vultures pulling and tearing shingles, trim, and rubber material on buildings and vehicles. Vultures can also present a risk to aircraft because of their large body mass and slow-flying or soaring behavior. DeVault et al. (2011) and Dolbeer et al. (2013) considered vultures to be one of the most hazardous birds for an aircraft to strike based on the frequency of strikes, effect on flight, and amount of damage caused by vultures throughout the country.

Vultures also prey upon newly born calves and harass adult cattle, especially during the birthing process. The National Agricultural Statistics Service (NASS) reported livestock owners lost 11,900 head of cattle and calves from vultures in the United States during 2010 valued at $4.6 million (NASS 2011). Livestock producers in North Carolina reported that, of those calves lost due to animal predators in 2010, 10.4% of calves were lost due to vultures (NASS 2011). During a survey of Florida ranchers, Milleson et al. (2006) reported that 82.4% of all livestock losses attributed to vultures were newborn calves, which exceeded the reported predation of all other livestock species and livestock age classes. Reports of predation associated with vultures occurred primarily from November through March; however, reports of predation occurred throughout the year (Milleson et al. 2006)

From FY 2004 through FY 2009, WS addressed 5,304 turkey vultures to alleviate damage based on requests for assistance received, which is an average of 884 vultures addressed annually. From FY 2010 to FY 2012, WS addressed 5,821 vultures, which is an average of 1,941 vultures annually. The average number of vultures addressed per year between FY 2010 and FY 2012 by WS was nearly 120% higher than the average number of turkey vultures addressed by WS from FY 2004 through FY 2009.

Need to Address Additional Requests for Assistance Associated With Killdeer

Similar to the other bird species addressed in this supplement, requests for assistance to manage damage and threats associated with killdeer in North Carolina occur primarily at airports where killdeer can cause damage to aircraft or threaten human safety from aircraft strikes. In the United States, 2,920 aircraft strikes involving killdeer have been reported between 1990 and 2012 (Dolbeer et al. 2013) with 42 occurring at airports in North Carolina (FAA 2013). Strikes involving killdeer have caused nearly $4 million in damages to civil aircraft and caused 745 hours of aircraft down time for repairs (Dolbeer et al. 2013).

Jackson and Jackson (2000) described the nesting habitat of killdeer as open areas with grass or forbs less than 1 cm tall. Nesting can occur on sandbars, mudflats, pastures, cultivated fields, airports, golf courses, parking lots, and graveled rooftops (Jackson and Jackson 2000). Airports often provide ideal nesting habitat for killdeer with nesting often occurring along the edges of runways and taxiways, which increases strike risks. From FY 2004 through FY 2009, WS addressed 903 killdeer to alleviate damage and threats

of damage at airports within the State, which is an average of 151 killdeer addressed annually (USDA 2010). From FY 2010 through FY 2012, WS addressed 2,057 killdeer, which is an average of 686 killdeer addressed annually. During the development of the EA, the highest number of killdeer addressed by WS occurred in FY 2009 when WS addressed 466 killdeer at airports to reduce aircraft strike risks. In FY 2011, WS addressed 991 killdeer to alleviate strike risks at airports within the State, which is an increase of nearly 113%.

Need to Address Additional Requests for Assistance Associated With Upland Sandpipers

The upland sandpiper, despite its name, is rarely associated with coastal or wetland habitats like other sandpipers. Upland sandpipers are a grassland species associated with the prairie regions of the north and central plains of North America (Houston et al. 2011). The open grassland environments associated with airports are often attractive to upland sandpipers. Houston et al. (2011) stated, "…*airports now supply half or more of this species' nesting sites in several northeastern U.S. states, where larger, contiguous tracts of grasslands are otherwise in short supply*". Although breeding populations of upland sandpipers do not occur in North Carolina (Houston et al. 2011), upland sandpipers may be present in the State during the migration periods as sandpipers migrate between breeding areas and wintering areas.

Requests for assistance associated with upland sandpipers originate from airports in the State where migrants pose aircraft strike hazards. Between 1999 and 2012, Dolbeer et al. (2013) identified 164 reported records involving civil aircraft striking upland sandpipers in the United States. Dolbeer et al. (2013) also indicated six of those strikes resulted in damage to the aircraft and six strikes had a negative effect on the flight of the aircraft. In addition, 16 reported strikes involved a civil aircraft striking multiple upland sandpipers at once (Dolbeer et al. 2013). Using aircraft strike data from 1990 through 2012, Dolbeer et al. (2013) calculated strike hazard rankings for bird and terrestrial mammals in the United States, including upland sandpipers. Dolbeer et al. (2013) ranked the upland sandpipers 48th based on the total reported strikes, the damage caused by those strikes, and the effect the strike had on the flight (Dolbeer et al. 2013).

Prior to FY 2009, WS had not received requests for assistance associated with upland sandpipers in the State. WS addressed one upland sandpiper during FY 2009 to alleviate strike hazards at an airport in the State. In FY 2012, WS addressed 45 upland sandpipers to reduce aircraft strike risks at airports in the State. Based on the increasing number of requests for assistance and the increasing number of upland sandpipers addressed annually, WS anticipates continuing to receive requests for assistance associated with upland sandpipers posing an aircraft strike risk at airports in the State.

Need to Address Additional Requests for Assistance Associated with Gulls

Since the EA was developed, WS has received increasing requests for assistance with reducing threats to ground nesting bird species from predation caused by great black-backed gulls and herring gulls on barrier islands within North Carolina. Predation is a naturally occurring event but becomes a management issue when predation occurs on species experiencing severe population declines or during the restoration of waterbird breeding sites (Hunter et al. 2006). Herring gulls and great black-backed gulls are aggressive predators of many species (Guillemette and Brousseau 2001, Hunter et al. 2006), including being major predators of terns, skimmers, and oystercatchers (Hunter et al. 2006). Studies conducted in Virginia found herring gulls and great black-backed gulls to be efficient predators on tern and black skimmer eggs, chicks, and fledglings (Becker 1995, O'Connell and Beck 2003). Fledgling success rates for common terns ranged from zero to 19% when nesting adjacent to a herring gull colony because gulls preyed on 44% to 94% of the chicks (Becker 1995). In another study, herring gulls preyed on 61% to 66% of common tern chicks in a colony (O'Connell and Beck 2003). Competition for nesting sites between gulls and other ground nesting colonial waterbirds can also result in the displacement of

smaller species (Gochfeld and Burger 1994). Kress et al. (1983) found that efforts to manage herring gulls and great black-backed gulls in the northeastern United States were successful in restoring tern nesting sites and increasing productivity at active tern nesting sites.

Historically, the nesting range of herring gulls and great black-backed gulls included the Canadian Maritimes region. However, herring gulls and great black-backed gulls have expanded their breeding range since the 1980s into Virginia and North Carolina (Hunter et al. 2006, Schweitzer 2011). An increase in human activity along the coast, including an increase in the number of open landfills and dumpsters from which gulls readily feed, likely facilitated the range expansion of great black-backed gulls and herring gulls (Drury 1973, Verbeek 1977, Erwin 1979, Patton 1988, Belant et al. 1993). The Southeast United States Regional Waterbird Conservation Plan stated that herring gulls and great black-backed gulls "*...have increased dramatically in the Southeast U.S. and are considered to be important predators on other coastal nesting waterbirds...*" (Hunter et al 2006).

Since 1977, observers have conducted periodic coast-wide surveys of colonial-nesting waterbirds in North Carolina. In total, observers have conducted 11 waterbird surveys in the State, with the most recent survey completed in 2011. During the 2011 survey, the number of herring gull nests (n = 682 nests) and great black-backed gull nests (n = 254 nests) had increased relative to the estimates from the previous coast-wide survey conducted in 2007. During this same time, biologists monitoring nesting colonial waterbirds and shorebirds in North Carolina noted the loss of tern, skimmer, and shorebird eggs and chicks to gulls, and have found that some of these species are not nesting on previously used sites, possibly due to gulls assuming nesting territories on the sites (Schweitzer 2011, S. Schweitzer, NCWRC pers. comm. 2012). Of particular concern is the decline in numbers of nesting piping plovers (*Charadrius melodus*), Wilson's plovers (*C. wilsonia*), American oystercatchers (*Haematopus paliatus*), gull-billed terns (*Gelochelidon nilotica*), common terns (*Sterna hirundo*), Caspian terns (*Hydroprogne caspia*), and black skimmers (*Rhynchops niger*). The United States Fish and Wildlife Service (USFWS) listed the piping plover as a threatened species in the State. The North Carolina Wildlife Resource Commission (NCWRC) considers gull-billed terns to be a threatened species in the State. The NCWRC considers the American oystercatcher, black skimmer, and common tern as species of special concern in the State. For monitoring and evaluation, the USFWS and/or the NCWRC generally identify areas where those nesting species occur on barrier islands.

In the mid-1980s, the North Carolina Waterbird Committee began development of a management plan for colonial-nesting waterbirds (Schweitzer 2011, S. Schweitzer, NCWRC pers. comm. 2012). The colonial-nesting waterbird plan provided estimates of desired population sizes for colonial-nesting waterbirds along the coast of North Carolina. For herring gulls and great black-backed gulls, the target for nesting pairs was set at ≤1,000 and ≤200, respectively (S. Schweitzer, NCWRC pers. comm. 2012). The Southeast United States Regional Waterbird Conservation Plan ranked herring gulls and great black-backed gulls in the "*population control*" action level that included those species' populations that were increasing to a level where adverse effects to populations of other species were occurring (Hunter et al. 2006). Hunter et al. (2006) recommended reducing the herring gull breeding population in North Carolina from approximately 1,000 nesting pairs to 750 nesting pairs. Hunter et al. (2006) also recommended reducing the great black-backed gull breeding population in North Carolina from 100 breeding pairs to 75 breeding pairs. The Conservation Plan recommended reducing the breeding populations of herring gulls and great black-backed bulls in North Carolina because those gull species "*...are serious predators on higher priority beach nesting species such as plovers, oystercatchers, and terns*" (Hunter et al. 2006). Hunter et al. (2006) also stated "[w]*here Herring and Great Black-backed Gulls are considered to be serious predators of other beach-nesting species, population control measures such as egg-addling and other disruptions of nesting may be necessary*".

However, the specific impact of nesting herring gulls and great black-backed gulls on other ground-nesting waterbirds on the beaches of North Carolina is largely unknown but is likely resulting in competition for nest sites with other species, which can result in reduced productivity from predation (Hunter et al. 2006). Hunter et al. (2006) concluded the interactions between gulls and other ground-nesting waterbird required further study in North Carolina. The NCWRC has developed research projects to document predation and to detect responses of other ground-nesting waterbirds to the removal of gulls in nesting areas. The NCWRC and/or other agencies could request WS assist with research projects involving the management of gulls at nesting locations within the State.

Based on the lack of requests for assistance received prior to the development of the EA, WS did not evaluate the need to address damage or threats associated with Bonaparte's gulls. However, since the completion of the EA, WS has received requests for assistance associated with Bonaparte's gulls. WS has received requests to assist in reducing threats to aviation safety caused by Bonaparte's gulls in eastern North Carolina. Aircraft striking gulls can lead to costly repairs to aircraft and can threaten human safety. The gulls create strike risks to aircraft by moving across runways and taxiways during airport operations, or moving through operational airspace associated with the airfield. Of the total known birds struck in the United States from 1990 through 2012, gulls comprised 15% of the strikes where identification occurred (Dolbeer et al. 2013). When struck, 22% of the reported gull strikes resulted in damage to the aircraft or had a negative effect on the flight (Dolbeer et al. 2013).

Bonaparte's gulls nest in trees of sparsely wooded areas around ponds, bogs, and bays in the taiga and boreal forests of Alaska and northern Canada (Burger and Gochfeld 2002). Bonaparte's gulls are an abundant migrant and winter visitor over much of North America with large flocks occurring in the coastal areas close to human activity. The gulls will also frequent inland lakes and rivers, coastal bays, estuaries, and inshore waters where aquatic organisms comprise a large portion of their diet (Burger and Gochfeld 2002). Non-breeding gulls often linger south of the breeding range (Burger and Gochfeld 2002). There are no breeding colonies of Bonaparte's gulls in North Carolina. The spring migration begins in mid-March and continues through the end of May while the fall migration begins in late-July and can continue through January (Burger and Gochfeld 2002). Freezing water inland during the winter often pushes Bonaparte's gulls further south and toward the coastal areas (Burger and Gochfeld 2002). When concentrated into large flocks or when mixed with other gull species, Bonaparte's gulls can pose strike hazards at airports in the State.

WS continues to receive requests for assistance to manage damage and threats of damage associated with ring-billed gulls, primarily at airports. Like other gull species, ring-billed gulls are often social and often form large groups as they roost, nest, and forage. Between FY 2004 and FY 2009, WS addressed 19,242 ring-billed gulls to alleviate damage or threats of damage, which is an average of 3,207 gulls addressed by WS annually. Between FY 2010 and FY 2012, WS addressed 29,569 ring-billed gulls, which is an average of 9,856 gulls addressed annually. The average number of gulls addressed annually by WS from FY 2010 through FY 2012 represents an increase of 207% over the average number of gulls addressed by WS from FY 2004 through FY 2009.

Need to Address Additional Requests for Assistance Associated With Mourning Doves

The number of doves addressed annually to reduce threats and damage has increased, primarily at airports. Threats associated with mourning doves at airports occur primarily during the spring and fall migration periods when doves congregate into large flocks. The flocking behavior associated with mourning doves increases the likelihood of ingesting multiple doves into aircraft engines, which can cause catastrophic failure of aircraft systems and can threaten the safety of the flight crew and passengers. Doves/pigeons are one of the most frequently struck bird groups (Dolbeer et al. 2013). Of the total known birds struck in the United States from 1990 through 2012, pigeons and doves comprised 15% of

the total reported strikes where identification occurred (Dolbeer et al. 2013). There have been 5,362 reported civil aircraft strikes involving mourning doves in the United States between 1990 and 2012 resulting in 10,516 hours of aircraft downtime and nearly $8.1 million in damages (Dolbeer et al. 2013).

Since 1990, mourning doves have been involved in 113 aircraft strikes in the State (FAA 2013). One strike involved multiple doves and resulted in 70 hours of aircraft downtime and over $160,000 in damages (FAA 2013). From FY 2004 through FY 2009, WS addressed 4,278 doves to alleviate damage and threats of damage at airports within the State, which is an average of 713 doves addressed annually (USDA 2010). From FY 2010 through FY 2012, WS addressed 18,814 doves, which is an average of 6,271 doves addressed annually. Between FY 2004 and FY 2009, the highest number of doves addressed in one year by WS occurred in FY 2007 when WS addressed 1,696 doves at airports to reduce aircraft strike risks. In comparison, WS addressed 11,965 mourning doves to alleviate strike risks at airports within the State during FY 2010.

Need to Address Additional Requests for Assistance Associated with Northern Mockingbirds and House Finches

WS has received increasing requests for assistance with reducing damage to property and threats to human safety associated with house finches and mockingbirds at air facilities within the State. WS has received requests for assistance associated with house finches and Northern mockingbirds nesting, roosting, and loafing on and inside of aircraft at air facilities. Those activities could result in costly cleanup and aircraft down time and could potentially cause damage to sensitive aircraft parts and ultimately human safety. In addition, fecal accumulations from those birds roosting, loafing, or nesting on aircraft could cause damage to other property at air facilities. Those bird species also pose aircraft strike hazards at air facilities by crossing runways and taxiways during the operation of the facility.

Between FY 2004 and FY 2010, WS addressed two mockingbirds during FY 2007 to alleviate damage or threats of damage associated with requests for assistance. WS received no other requests for assistance associated with mockingbirds between FY 2004 and FY 2010. Since completion of the EA, WS addressed 15 mockingbirds during FY 2011 and 71 mockingbirds during FY 2012 at air facilities to alleviate damage to property and threats to human safety. Similarly, the number of house finches addressed to alleviate damage or threats of damage associated with requests for assistance have also increased since completion of the EA. Between FY 2004 and FY 2008, WS did not receive requests for assistance associated with house finches. In FY 2009, WS addressed three house finches in the State and one finch during FY 2010. In FY 2012, WS addressed 214 house finches at airports to address damage and threats of damage. WS anticipates requests for assistance associated with mockingbirds and finches to continue to increase, primarily at airports.

Need to Address Additional Requests for Assistance Associated with Common Grackles and Brown-headed Cowbirds

The blackbird group in North America is comprised of ten species of birds, including common grackles and brown-headed cowbirds (Dolbeer 1994). The blackbird group includes some of the most prolific and abundant birds in North America (Dolbeer and Stehn 1983). During the migration periods, common grackles and brown-headed cowbirds often form mixed species flocks with other blackbird species. Outside of the nesting season, blackbirds generally feed and roost in flocks varying from a few birds to over a million birds (Dolbeer 1994). Feeding flocks and roosting congregations are sometimes comprised of a single species, but often several species mix. In North Carolina, winter flocks are often composed of migrants from Canada and the northern United States along with birds that are present in the State throughout the year. The tendency of blackbirds to form large communal roosts and to travel in large social flocks often results in locally serious damage to crops where monetary losses to individual

agricultural producers can be substantial (*e.g*., see Hothem et al. 1988, Glahn and Wilson 1992). Accumulations of fecal droppings under areas where large congregations of blackbirds and starlings roost, loaf, or feed can cause damage to or pose threats of damage to a variety of resources in North Carolina. Reports of damages or threats of damage from accumulations of fecal droppings can occur at dairies and livestock facility (*e.g*., consumption and contamination of feed) in the State. In addition, damage and threats of damage can also occur to buildings and property (*e.g*., damage to structures from the acid in fecal droppings), from potential disease risks to human and animal safety (*e.g*., fecal droppings in public use areas), and to aesthetics (*e.g*., noise, smell). Large flocks of blackbirds can also pose aircraft strike risks at airports in the State.

WS addressed 55 brown-headed cowbirds in the State during FY 2009 to alleviate threats to property and to reduce risks to human safety, which was the only time WS specifically addressed cowbirds from FY 2004 through FY 2009 during the development of the EA. Between FY 2010 and FY 2012, WS addressed 8,568 cowbirds, which is an average of 2,856 cowbirds addressed annually. In FY 2010, WS addressed 5,318 cowbirds, which was the highest number addressed between FY 2010 and FY 2012. Between FY 2009 and FY 2010, the number of cowbirds addressed by WS increased by 5,263 cowbirds.

From FY 2004 through FY 2009, WS addressed an average of 196 grackles per year in the State to alleviate damage; however, from FY 2010 through FY 2012, WS addressed an average of 478 grackles per year, which represents a 144% increase in the number of grackles addressed annually. WS anticipates requests for assistance associated with grackles and cowbirds to continue to increase, primarily at airports.

Need to Address Additional Requests for Assistance Associated with other Bird Species

WS has also addressed aircraft strike risks at airfields in the State associated with bufflehead, red-breasted mergansers, northern bobwhite, pied-billed grebes, American bitterns, snowy egrets, Mississippi kites, sandhill cranes, ruddy turnstones, sanderlings, Forster's terns, sandwich terns, least terns, merlin, Eastern kingbirds, Eastern bluebirds, and brown thrashers. Table 3 shows the number of reported civil aircraft strikes in the United States since 1990 involving those species. Although WS has addressed those species to alleviate strike risks at airports, WS has addressed those species infrequently or in limited numbers since the EA was developed.

As demonstrated in Table 3, aircraft have struck those species of birds in the United States and when present on or near airfields in North Carolina, those bird species could pose strike hazards to aircraft. Of the 86 bird species with hazard rankings conducted by Dolbeer et al. (2013), sandhill cranes ranked seventh based on the percentage of strikes causing damage to the aircraft, the percentage of strikes resulting in major damage to the aircraft, and percentage of strikes having a negative effect on the flight. Similarly, Dolbeer et al. (2013) assigned a hazard rank of 48 to merlin.

WS had not received requests for assistance associated with bluebirds prior to FY 2012. During FY 2012, WS addressed 14 bluebirds to alleviate damage or threats of damage occurring at airports where bluebirds were persistently attempting to nest within aircraft. WS also received a similar request for assistance associated with bluebirds at an airport during FY 2013. WS has received requests for assistance associated with brown thrashers nesting, roosting, and loafing on and inside of aircraft at air facilities. Nesting, roosting, and loafing on and inside of aircraft could result in costly cleanup and aircraft down time and could potentially cause damage to sensitive aircraft parts and ultimately human safety.

Sandhill cranes have been involved in 111 reported strikes to civil aircraft in the United States from 1990 through 2012, with 34 strikes involving multiple cranes. Reported aircraft strikes involving sandhill cranes in United States since 1990 have caused nearly $224,000 in damages to aircraft and resulted in 2,363 hours of aircraft downtime. Aircraft strikes involving sandhill cranes have resulted in injuries to

pilots or passengers (Dolbeer et al. 2013). Similarly, aircraft strikes involving snowy egrets have caused injuries to pilots and passengers (Dolbeer et al. 2013).

Table 3 – Reported civil aircraft strikes in the United States by identified bird species, 1990 - 2012†

Species	Number of Reported Strikes				Reported Economic Damage	
	Total Strikes	With Damage	Negative Flight Effect	With multiple animals	Aircraft down time (hrs)	Reported Cost ($)
Bufflehead	8	1	2	1	40	5,416
Red-breasted Merganser	4	1	--	1	2	--
Northern Bobwhite	9	2	3	1	73	1,127
Pied-billed Grebe	21	1	1	--	--	--
American Bittern	7	3	2	--	646	54,245
Snowy Egret	28	3	1	1	50	--
Mississippi Kite	1	--	--	--	--	--
Sandhill Crane	111	45	30	34	2,363	223,857
Ruddy Turnstone	15	--	--	1	--	--
Sanderling	22	1	3	9	6	--
Forster's Tern	10	--	1	2	4	--
Sandwich Tern	1	--	--	--	--	--
Least Tern	19	--	--	2	--	--
Merlin	58	1	3	3	23	514,089
Eastern Kingbird	19	1	1	--	--	13,096
Eastern Bluebird	5	--	--	1	--	--
Brown Thrasher	10	--	--	--	--	220

† Adapted from Dolbeer et al. (2013)

Reported aircraft strikes involving merlin have caused over $514,000 in damages to aircraft in the United States since 1990. WS anticipates continuing to receive requests for assistance associated with those bird species at airports in the State.

SCOPE OF ANALYSIS

The EA and this supplement to the EA evaluate damage management activities in North Carolina to reduce threats to human safety and to resolve damage to property, natural resources, and agricultural resources on federal, state, tribal, municipal, and private land within the State of North Carolina wherever a cooperator requests such assistance. The scope of analysis remains valid as addressed in the EA unless otherwise discussed in this supplement.

Actions Analyzed

The EA evaluates the need for bird damage management to reduce threats and damage occurring to property, human safety, natural resources, and agricultural resources on private or public land within the State wherever such management was requested from the WS program (USDA 2010). The EA and this supplement discuss the issues associated with conducting damage management in the State to meet the need for action. The EA and this supplement also evaluate different alternatives to meet 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 or damage situation, taking action, evaluating the action taken, and monitoring results of the actions taken (see WS Directive 2.201). The published article provides more detail on the processes used in WS'

Decision Model. 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 2010).

Appendix B of the EA discusses the methods available for use under the alternatives. The alternatives and Appendix B in the EA also discuss how WS would employ methods to manage damage and threats associated with birds in the State. Therefore, the actions evaluated in the EA and this supplement to the EA are the use of those methods available under the alternatives and the employment of those methods by WS to manage or prevent damage associated with birds from occurring when permitted by the USFWS.

The Migratory Bird Treaty Act (MBTA) makes it unlawful to pursue, hunt, take, capture, kill, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, nests, or eggs (16 USC 703-711). A list of bird species protected under the MBTA occurs in 50 CFR 10.13. The MBTA does allow for the lethal removal of those bird species listed in 50 CFR 10.13 when depredation occurs through the issuance of depredation permits or the establishment of depredation/control orders. Under authorities in the MBTA, the USFWS is the federal agency responsible for the issuance of depredation permits or the establishment of depredation/control orders for the take of those protected bird species when damage or threats of damage are occurring. Information regarding migratory bird permits occurs in 50 CFR 13 and 50 CFR 21.

Native American Lands and Tribes

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

Federal, State, County, City, and Private Lands

Under two of the alternatives analyzed in detail in the EA, WS could continue to provide damage management activities on federal, state, county, municipal, and private land in North Carolina when WS received a request for such services by the appropriate property owner or manager. In those cases where a federal agency requests WS' assistance with managing damage caused by birds, the requesting agency would be responsible for analyzing those activities in accordance with the NEPA. However, the EA and this supplement would cover such actions if the requesting federal agency determined the analyses and scope of the EA and this supplement were appropriate for those actions and the requesting federal agency adopted the EA through their own Decision based on the analyses in the EA and this supplement. Therefore, the scope of the EA and this supplement to the EA include activities that WS could conduct on properties owned or managed by other federal entities.

Period for which this EA is valid

If the analyses in this supplement indicates an Environmental Impact Statement (EIS) is not warranted, the EA, as supplemented, would remain valid until WS, in consultation with the USFWS and the NCWRC, determines that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, WS would review the analyses in the EA and this supplement and would further supplement the EA or conduct other appropriate evaluations pursuant to the NEPA. Review of the EA and the supplement would ensure that activities conducted under the selected alternative occurred within the parameters evaluated in the EA and the supplement. If the decision-maker selected the alternative that analyzed no involvement in damage management activities by WS, there would be no monitoring of activities based on the lack of involvement by WS. Monitoring of activities would ensure the EA remained appropriate to the scope of damage management activities conducted by WS.

Site specificity

The site specificity of the EA and this supplement will remain as addressed in Section 1.3.4 of the EA (USDA 2010). The EA analyzed the potential impacts of alternative approaches to managing damage associated with birds that WS could conduct on private and public lands in North Carolina where damage management activities were occurring or have occurred previously under a MOU, cooperative service agreement, and in cooperation with the appropriate public land management agencies. The EA also addresses the potential impacts of conducting damage management approaches on areas where WS could sign additional MOUs, cooperative service agreements, or other comparable documents in the future. Because the goals and directives of WS would be to provide assistance when requested, within the constraints of available funding and workforce, it is conceivable that additional damage management efforts under the alternatives could occur. Thus, the EA and this supplement to the EA anticipate those additional efforts and evaluate the impacts of such efforts as part of the alternatives.

Most of the bird species addressed in the EA and this supplement to the EA occur statewide and throughout the year in North Carolina; therefore, damage or threats of damage could occur wherever individuals of those species occur. Planning for the management of bird damage must be viewed as being conceptually similar to other entities whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they would occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire departments, police departments, emergency clean-up organizations, and insurance companies. Although WS could predict some of the sites, where bird damage would occur, WS could not predict all of the specific locations, or times, where such damage would occur in any given year. The threshold triggering an entity to request assistance from WS to manage damage associated with birds would often be unique to that individual; therefore, predicting where and when WS would receive such a request for assistance would be difficult. The EA emphasizes major issues as those issues relate to specific areas whenever possible; however, many issues would apply wherever bird damage and the resulting management actions occurred and the evaluations in the EA treat those issues as such.

Chapter 2 of the EA identifies and discusses issues relating to bird damage management in North Carolina. The standard WS Decision Model (see WS Directive 2.201; Slate et al. 1992, USDA 2010) would be the site-specific procedure for individual actions conducted by WS in the State (see Chapter 3 in the EA for a description of the Decision Model and its application). Decisions made using the model would be in accordance with WS' directives and Standard Operating Procedures (SOPs) described in the EA as well as relevant laws and regulations. The analyses in the EA and this supplement apply to any action that may occur in any locale and at any time within North Carolina. In this way, WS believes it

meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to address damage and threats associated with birds in the State.

Public Involvement

WS made the EA available to the public for review and comment through a legal notice published in *The News and Observer* newspaper on October 1, 2010. A notice of availability and the EA were also available for public review and comment on the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml beginning on September 27, 2010. WS also mailed a letter of availability directly to agencies, organizations, and individuals with probable interest in bird damage management in the State. The public involvement process ended on November 5, 2010. WS received no comment letters during the public comment period.

After consideration of the analyses contained in the EA and review of comments, WS issued a Decision and Finding of No Significant Impact (FONSI) on November 23, 2010 for the EA. The Decision and FONSI selected the proposed action alternative, which implemented an integrated damage management program using multiple methods to address the need to manage bird damage.

This supplement to the EA, along with the EA and the 2010 Decision and FONSI, will be 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 at a minimum in *The News and Observer* and posted on the APHIS website located at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml according to WS' public notification requirements (see 72 FR 13237-13238). WS will also mail a notice of availability for this supplement directly to agencies, organizations, and individuals with probable interest in the proposed program. WS will fully consider comments received during the public involvement process and WS will review each comment for substantive information, issues, and alternatives.

DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS was the lead agency during the development of the EA, and therefore, responsible for the scope, content, and decisions made. Management of migratory birds is the responsibility of the USFWS under the MBTA. As the authority for the management of bird populations, the USFWS was involved in the development of this supplement to the EA and provided input throughout the preparation process to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The NCWRC is responsible for managing wildlife in the State of North Carolina, including the establishment and enforcement of regulated hunting seasons in the State. For migratory birds, the NCWRC can establish hunting seasons for harvestable species under frameworks determined by the USFWS. WS' activities to reduce and/or prevent bird damage in the State would be coordinated with the USFWS and the NCWRC, which would ensure actions conducted by WS would be incorporated into population objectives established by those agencies for wildlife populations in the State.

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 bird damage management to alleviate damage and threats of damage in North Carolina, 2) should WS continue to conduct disease surveillance and monitoring in bird populations when requested by the NCWRC, the USFWS, and other agencies, 3) should WS continue to implement an integrated damage management strategy, including technical assistance and direct operational assistance, to meet the need for bird damage management in the State, 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 or implementing one of the other alternatives result in effects to the human environment requiring the preparation of an EIS based on the analyses in this supplement to the EA.

RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS has determined an EA that evaluates the need for action, the issues associated with meeting the need for action, and the alternative approaches to meeting the need for action at the State level provides a more thorough analysis. Therefore, WS' decision and actions regarding managing bird damage in North Carolina would rely solely and exclusively on the decision and record related to the EA. The EA developed by WS to address the need to reduce damage associated with birds incorporated by reference sections, discussions, appendices, or other portions thereof, of the WS programmatic Final Environmental Impact Statement (FEIS). This supplement to the EA does not incorporate by reference that FEIS.

The USFWS has developed a FEIS to address the need to manage resident Canada goose populations (USFWS 2005). The FEIS evaluates the potential impacts associated with implementing alternative strategies to manage increasing resident Canada goose populations to alleviate damage and threats.

The USFWS has also developed a FEIS to manage damage and increasing populations of double-crested cormorants in the United States (USFWS 2003). The selected alternative in the FEIS established a Public Depredation Order (see 50 CFR 21.48) and modified the existing Aquaculture Depredation Order (see 50 CFR 21.47). To allow for an adaptive evaluation of activities conducted under the Orders established by the FEIS, those Orders would have expired on April 30, 2009 (USFWS 2003). To evaluate activities authorized under the FEIS, the USFWS developed an EA. The EA determined that a five-year extension of the expiration date of the PRDO and the AQDO would not threaten cormorant populations (74 FR 15394-15398; USFWS 2009).

The USFWS has also developed an EA that evaluated permitting the take of bald eagles and golden eagles pursuant to the Bald and Golden Eagle Protection Act (USFWS 2010). The selected alternative in that EA authorized the disturbance of eagles, authorized the removal of eagle nests where necessary to reduce human safety, and evaluated the issuance of permits for the limited lethal take of eagles (USFWS 2010).

In addition, the WS program in North Carolina developed an EA to evaluate the need for and alternative approaches to addressing damage and threats of damage associated with Canada geese in the State (USDA 2003*a*) and developed an EA to assess managing damage caused by rock pigeons, European starlings, and house sparrows (USDA 2003*b*).

AUTHORITY AND COMPLIANCE

WS is authorized by law to reduce damage caused by animals through the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b), as amended and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). Management of native migratory birds is the responsibility of the USFWS under the MBTA. As the authority for the management of birds, WS consulted with the USFWS during the development of the EA to ensure an interdisciplinary approach according to the NEPA and agency mandates, policies, and regulations. The NCWRC is responsible for managing wildlife in the State of North Carolina, including birds. The USFWS and the NCWRC provided information to assist in the analysis of potential impacts of WS' proposed activities on bird populations in the State.

The EA and this supplement to the EA ensures WS' actions comply with the NEPA, with the Council on Environmental Quality guidelines (40 CFR 1500), and with APHIS' NEPA implementing regulations (7 CFR 372). WS would conduct damage management activities, including disposal requirements,

consistent with: 1) the Endangered Species Act of 1973, 2) the MBTA, 3) the Bald and Golden Eagle Protection Act, 4) the Federal Insecticide, Fungicide, and Rodenticide Act, 5) applicable Executive Orders, and 6) applicable federal, state, and local laws, regulations and policies, including WS' Directives.

AFFECTED ENVIRONMENT

Upon receiving a request for assistance, WS could conduct activities on federal, state, tribal, municipal, and private properties in North Carolina. The areas of the proposed action could include areas in and around commercial, industrial, public, and private buildings, facilities and properties and at other sites where birds may roost, loaf, feed, nest, or otherwise occur. Examples of areas where bird damage management activities could be conducted are, but would not necessarily be limited to: agricultural fields, vineyards, orchards, farmyards, dairies, ranches, livestock operations, aquaculture facilities, fish hatcheries, grain mills, grain handling areas, railroad yards, waste handling facilities, industrial sites, natural areas, government properties and facilities, private properties, corporate properties, schools, hospitals, parks, woodlots, recreation areas, communally-owned homeowner/property owner association properties, wildlife refuges, wildlife management areas, military bases, and airports. WS would conduct bird damage management when requested by a landowner or manager and only on properties where WS and the cooperating entity signed a MOU, cooperative service agreement, or other comparable document.

ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

Chapter 2 of the EA discusses the issues analyzed in detail while Chapter 3 of the EA discusses the alternatives developed and identified during the development of the EA to address those issues (USDA 2010). WS, in consultation with the USFWS and the NCWRC, identified the following issues during the scoping process for the EA:

- Issue 1 - Effects of Damage Management Activities on Target Bird Populations
- Issue 2 - Effects on Non-target Wildlife Species Populations, Including T&E Species
- Issue 3 - Effects of Damage Management Methods on Human Health and Safety
- Issue 4 - Effects on the Aesthetic Values of Birds
- Issue 5 - Humaneness and Animal Welfare Concerns of Methods
- Issue 6 - Effects of Bird Damage Management Activities on the Regulated Harvest of Birds

Based on those damage management activities conducted previously by WS since the Decision and FONSI were signed in 2010 and in consultation with the USFWS and the NCWRC, 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 birds in the State.

ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

In addition to the issues considered in detail, the scoping process for the EA also identified additional issues that WS considered during the development of the EA. However, WS did not considered those issues in detail for the reasons provided in Section 2.3 of the EA. WS has reviewed the issues not considered in detail as described in Section 2.3 of the EA and has determined that the analyses provided in the EA is still appropriate regarding those issues.

DESCRIPTION OF THE ALTERNATIVES

Chapter 3 of the EA identifies and describes the alternatives considered and evaluated using the identified issues (USDA 2010). In addition, Chapter 4 of the EA analyzes the environmental consequences of each alternative as those alternatives relate to the issues identified (USDA 2010). Appendix B of the EA provides a description of the methods that WS could use or recommend under each of the applicable alternatives. The EA describes three potential alternatives to address the issues identified above. Alternatives analyzed in detail include:

Alternative 1 – Continuing the Current Integrated Approach to Managing Bird Damage (Proposed Action/No Action)
Alternative 2 – Bird Damage Management by WS through Technical Assistance Only
Alternative 3 - No Bird Damage Management Conducted by WS

ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

WS also considered six additional alternatives; however, a detailed evaluation of those alternatives did not occur for the reasons provided in Section 3.2 of the EA (USDA 2010). WS has reviewed the alternatives not analyzed in detail in the EA and has determined that the rationale for not evaluating those alternatives in detail has not changed and is still appropriate.

STANDARD OPERATING PROCEDURES

Chapter 3 of the EA discusses those SOPs that WS would incorporate into activities conducted pursuant to the relevant alternatives (USDA 2010). WS would incorporate those SOPs into activities under the proposed action alternative (Alternative 1), and when applicable, under the technical assistance alternative (Alternative 2). If the decision-maker selected the no involvement by WS alternative (Alternative 3), the lack of assistance by WS would preclude the employment or recommendation of those SOPs addressed in the EA by WS. WS has reviewed those SOPs discussed in the EA. Those SOPs remain appropriate and applicable to the proposed activities.

ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

Chapter 2 of the EA discusses the issues identified as important to the scope of the analysis (see 40 CFR 1508.25). Chapter 3 of the EA discusses the alternatives developed and identified during the development of the EA to meet the need for action and to address those issues (USDA 2010). Potential impacts associated with Alternative 2 and Alternative 3 on the human environment related to the major issues have not changed from those described and analyzed 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 2010). Alternative 1 (proposed action/no action), as described in the EA, addresses requests for bird damage management in the State using an integrated damage management approach by WS. 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 based on information in this supplement to the EA as those analyses relate to Alternative 1 (proposed action/no action alternative):

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

Under the proposed action, WS could incorporate non-lethal and lethal methods described in Appendix B of the EA in an integrated approach. Under an integrated approach, WS could use all or a combination of methods to resolve a request for assistance. WS could recommend and operationally employ both non-

lethal and lethal methods, as governed by federal, state, and local laws and regulations under the proposed action.

Non-lethal methods could disperse or otherwise make an area unattractive to birds that are causing damage; thereby, reducing the presence of birds at the site and potentially the immediate area around the site where WS employed non-lethal methods. WS would give priority to non-lethal methods when addressing requests for assistance (see WS Directive 2.101). However, WS would not necessarily employ non-lethal methods to resolve every request for assistance if deemed inappropriate by WS' personnel using the WS Decision Model, especially in situations where the requesting entity had already attempted to resolve the damage or threats of damage using non-lethal methods. WS could use non-lethal methods to exclude or harass target birds from areas where damage or threats were occurring. When effective, non-lethal methods would disperse birds from the area resulting in a reduction in the presence of those birds at the site where WS employed those methods. From FY 2010 through FY 2012, WS employed non-lethal methods to harass and disperse birds in North Carolina as part of an integrated approach to managing damage and threats. Non-lethal methods would have minimal effects on overall populations of birds since those individuals dispersed would be unharmed. WS would not employ non-lethal methods over large geographical areas and would not apply those methods at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over such a wide geographical scope that long-term adverse effects would occur to a species' population. The continued use of non-lethal methods often leads to the habituation of birds to those methods, which can decrease the effectiveness of those methods.

WS could employ lethal methods to reinforce non-lethal methods and to remove birds that WS' personnel identified as causing damage or posing a threat to human safety. The use of lethal methods could result in local reductions of birds in the area where damage or threats were occurring. The number of birds removed from a species' population using lethal methods would be dependent on the number of requests for assistance received, the number of birds involved with the associated damage or threat, and the efficacy of methods employed.

Those people experiencing damage could remove birds in the absence of WS' direct involvement under Alternative 2 and Alternative 3 since the take of birds could continue to occur when the USFWS issued a depredation permit pursuant to the MBTA. In addition, people experiencing damage could remove certain bird species to alleviate damage or reduce threats under depredation/control orders and/or during the regulated hunting seasons in the State. For those bird species afforded no protection under the MBTA, lethal removal could occur at any time without a need for a depredation permit. Since the lack of WS' direct involvement does not preclude the lethal removal of birds by those persons experiencing damage or threats, WS' involvement in removing those birds under the proposed action would not be additive to the number of birds that could be removed by other entities in the absence of WS' involvement. As was discussed in the EA and this supplement, entities other than WS have also lethally removed birds in the State to alleviate damage or threats of damage. The number of birds removed annually would likely be similar across the alternatives, since the lethal removal of birds could occur even if WS was not directly involved with providing assistance under Alternative 2 and Alternative 3. Those activities proposed, including the proposed lethal removal of birds under Alternative 1, would not be additive to the number of birds that could be taken by other entities under the other alternatives despite the lack of WS' involvement.

The level of take under Alternative 2 and Alternative 3 would likely remain at least similar to the levels of lethal removal that has occurred previously but could increase to levels addressed under the proposed action alternative even if WS only provides technical assistance or provides no assistance. The lack of direct operational assistance provided by WS would not likely result in a decline in the number of birds

lethally taken in the State since WS' take would likely not be additive to the number of birds that could have been taken if WS had not participated in those activities.

In addition, most non-lethal and lethal methods available for resolving damage or threats associated with birds would be available under any of the alternatives. The avicide DRC-1339, the sedative alpha-chloralose, and the repellent mesurol would be the only methods that would not be available under all of the alternatives. The use of DRC-1339, alpha chloralose, and mesurol would only be available under the proposed action alternative since those products are only available for use by WS' personnel. DRC-1339 is only available for use to manage damage associated with blackbird species, pigeons, and gulls; however, only formulations targeting blackbird species and pigeons are currently available for use by WS in North Carolina. Mesurol is registered with the EPA to discourage crows from feeding on the eggs of threatened and endangered (T&E) species; however, mesurol is not currently registered for use in the State. Alpha-chloralose is registered with the United States Food and Drug Administration for WS to capture waterfowl, coots, and pigeons. Based on the evaluation in the EA, the availability of DRC-1339, alpha-chloralose, and mesurol to manage damage or threats of damage associated with those bird species under the proposed action would not pose significant environmental risks when used by trained WS' personnel and in accordance with use guidelines (USDA 2010). Therefore, WS' use of those methods available under all of the alternatives would not be additive to the environmental status quo since those methods could be employed by any entity experiencing damage or threats caused by birds.

WS continued to implement and employ an integrated damage management approach to reducing threats and damage caused by birds from FY 2010 through FY 2012 by recommending and using multiple methods. WS conducted 200 technical assistance projects from FY 2010 through FY 2012 involving bird species by recommending methods to resolve damage and threats without WS' direct involvement (see Table 1). Requests for assistance involved damage and threats to a variety of resources and often involved multiple resources (*e.g.*, vultures can cause damage to property by tearing shingles and pose a risk to human safety from fecal droppings in areas used by people). WS conducted 68 technical assistance projects involving black vultures from FY 2010 through FY 2012, which was the highest of any bird species followed by 37 technical assistance projects involving turkey vultures. WS provided technical assistance to those people requesting assistance involving at least 30 species of birds in North Carolina from FY 2010 through FY 2012.

Bird Damage Management Conducted in North Carolina by WS during FY 2010

The WS program in North Carolina responded to requests for bird damage management during FY 2010. WS responded to requests for assistance across a broad range of resources and bird species. WS conducted 62 technical assistance projects by providing information to requesters through the dissemination of leaflets, demonstrations, presentations, and by providing guidance on methods available to manage bird damage. Table 4 reflects the number of birds by species addressed by WS during FY 2010 to resolve damage to agricultural resources, natural resources, property, and to reduce threats to human health and safety.

Pursuant to the proposed action alternative, WS employed an integrated approach to managing damage associated with birds in the State when requested by a resource owner. Most requests for assistance were associated with aircraft strike hazards at airports and military bases within the State. The presence of birds in the immediate airspace of airports poses a direct threat to aviation safety from the potential for strikes by aircraft. Aircraft striking birds can lead to costly repairs to aircraft, lost revenue from aircraft downtime, and can threaten human safety. Strikes can also lead to catastrophic failure of aircraft leading to crashes. As part of an assistance request at an airport, WS conducts a thorough investigation of the airport property and surrounding areas to identify potential attractants of birds.

When employing an integrated approach to managing damage and threats of damage, WS used both lethal and non-lethal methods during FY 2010 as part of an integrated approach. After repeated use of non-lethal methods, birds often habituate to those methods and become non-responsive to the use of those methods. Therefore, lethal methods can enhance the effectiveness of non-lethal methods. In addition, WS may employ lethal methods to remove birds that are posing immediate threats of damage or when WS identifies specific birds causing damage.

WS addressed at least 46 species of birds in North Carolina during FY 2010 to alleviate damage or threats of damage. Nearly 57% of the birds WS addressed using non-lethal methods were gull species. WS addressed over 23,500 laughing gulls and over 8,200 ring-billed gulls during FY 2010, primarily using non-lethal dispersal methods. WS also addressed nearly 12,000 mourning doves during FY 2010 to alleviate damage or threats of damage at airports in the State. Using non-lethal harassment methods, WS dispersed nearly 98% of the birds addressed during FY 2010. WS dispersed birds primarily using pyrotechnics and other noise producing devices. In addition, WS destroyed one nest with four killdeer eggs and one nest with six barn swallow eggs during FY 2010.

Table 4 – Number and species of birds addressed in North Carolina by WS during FY 2010

Species	Dispersed	Take	Species	Dispersed	Take
Feral Duck	0	20	**Greater Yellowlegs**	1	0
Wood Duck	3	0	**Upland Sandpiper**	2	8
Mallard	36	1	**Bonaparte's Gull**	2	0
Blue-winged Teal	3	0	**Laughing Gull**	23,487	82
Green-winged Teal	2	0	**Ring-billed Gull**	8,187	63
Hooded Merganser	25	0	**Herring Gull**	1,002	3
Ruddy Duck	1	0	**Great Black-backed Gull**	119	1
Northern Bobwhite	8	0	**Forster's Tern**	51	1
Wild Turkey	35	0	**Royal Tern**	17	1
Double-crested Cormorant	56	0	**Sandwich Tern**	420	5
American Bittern	1	1	**Mourning Dove**	11,269	696
Great Blue Heron	50	22	**Great Horned Owl**	1	0
Great Egret	0	3	**American Kestrel**	2	0
Snowy Egret	0	1	**Merlin**	1	0
Little Blue Heron	2	1	**American Crow**	466	3
Cattle Egret	0	5	**Fish Crow**	613	5
Black Vulture	12	10	**Northern Rough-winged Swallow**	96	0
Turkey Vulture	1,874	68	**Red-winged Blackbird**	5	0
Osprey	14	0	**Eastern Meadowlark**	61	0
Northern Harrier	3	0	**Common Grackle**	773	12
Red-tailed Hawk	35	0	**Brown-headed Cowbird**	5,210	108
American Coot	0	1	**Blackbirds (mixed)**	2,950	2
Black-bellied Plover	399	3	**House Finch**	0	1
Killdeer	424	100			

Shooting was the primary method WS employed to remove birds in FY 2010. Shooting also effectively acts as a harassment and dispersal method during lethal removal and is selective for target species. The three bird species with the highest level of take in FY 2010 were mourning doves, brown-headed cowbirds, and killdeer. WS removed individual birds of those species at airports where WS had identified those birds as posing a serious threat to aircraft safety during FY 2010. Mourning doves and cowbirds are considered gregarious species (*i.e.*, form large flocks), especially during the migration periods. Large flocks of birds increase risks associated with bird strikes since aircraft striking multiple birds can increase

damage to the aircraft. Killdeer are a ground nesting species that prefer areas with sparse vegetation. Airports are often ideal locations for killdeer to nest; therefore, killdeer are often present along taxiways and runways and often pose immediate threats to aircraft.

Take of birds by WS in North Carolina during FY 2010 occurred within the parameters of take analyzed in the EA that determined those take levels would not adversely impact the populations of those species, except for the take of mourning doves and brown-headed cowbirds. In addition, WS addressed Northern bobwhite, American bitterns, snowy egrets, upland sandpipers, Bonaparte's gulls, Forster's terns, sandwich terns, and merlin in FY 2010; however, the EA did not specifically address a need for action associated with those species. All take by WS occurred within take levels permitted by the USFWS under depredation permits issued to WS or to entities in which WS was acting as a subpermittee under the permit.

Bird Damage Management Conducted in North Carolina by WS during FY 2011

The WS program in North Carolina continued to respond to requests for bird damage management during FY 2011. WS provided technical assistance to those cooperators requesting information on resolving bird damage. WS conducted 42 technical assistance projects by providing information to requesters through the dissemination of leaflets, demonstrations, presentations, and by providing guidance on methods available to manage bird damage. WS responded to requests for assistance across a broad range of resources and bird species. Table 5 reflects the number of birds by species addressed by WS during FY 2011 to resolve damage to agricultural resources, natural resources, property, and to reduce threats to human health and safety.

Table 5 - Number and species of birds addressed in North Carolina by WS during FY 2011

Species	Dispersed	Take	Species	Dispersed	Take
Wood Duck	2	0	**Greater Yellowlegs**	3	0
Mallard	8	0	**Upland Sandpiper**	5	9
Bufflehead	2	0	**Sanderlings**	2	2
Hooded Merganser	16	1	**Laughing Gull**	13,989	85
Common Merganser	5	0	**Ring-billed Gull**	16,560	55
Wild Turkey	633	7	**Herring Gull**	1,238	4
Double-crested Cormorant	448	0	**Common Tern**	83	1
Great Blue Heron	53	20	**Forster's Tern**	21	0
Great Egret	57	1	**Royal Tern**	60	0
Cattle Egret	23	6	**Mourning Dove**	2,954	906
Green Heron	1	0	**American Kestrel**	43	0
White Ibis	220	0	**Merlin**	1	0
Black Vulture	137	11	**American Crow**	644	20
Turkey Vulture	1,324	106	**Fish Crow**	447	7
Osprey	16	2	**Northern Rough-winged Swallow**	58	2
Mississippi Kite	57	0	**Barn Swallow**	0	13
Northern Harrier	6	0	**Northern Mockingbird**	10	5
Cooper's Hawk	1	0	**Red-winged Blackbird**	149	4
Red-shouldered Hawk	7	0	**Eastern Meadowlark**	1,236	22
Red-tailed Hawk	56	1	**Common Grackle**	448	94
Sandhill Crane	2	0	**Brown-headed Cowbird**	927	52
Black-bellied Plover	412	1	**Blackbirds (mixed)**	1,700	0
Killdeer	876	115			

Pursuant to the proposed action alternative, WS employed an integrated approach to managing damage associated with birds in the State when requested by a resource owner. Similar to FY 2010, most requests for assistance were associated with aircraft strike hazards at airports and military bases within the State. WS continued to employ an integrated approach to managing damage and threats of damage during FY 2011, including the use of both lethal and non-lethal methods. WS dispersed using non-lethal methods nearly 97% of the birds addressed during FY 2011. WS dispersed birds primarily using pyrotechnics and other noise producing devices. WS addressed damage or threats of damage associated with at least 44 species of birds during FY 2011 (see Table 5). Nearly 71% of the birds WS addressed using non-lethal methods were gull species. In addition, WS destroyed one nest with seven red-tailed hawk eggs, one osprey nest (no eggs), and eight nests with eleven barn swallow eggs during FY 2011. WS also translocated nine turkeys, freed 15, and collared 13 in FY 2011.

WS addressed over 16,600 ring-billed gulls and over 14,000 laughing gulls during FY 2011, primarily using non-lethal methods. In addition, WS addressed nearly 3,900 mourning doves at airports to alleviate aircraft strike hazards. The three bird species with the highest level of take in FY 2011 were mourning doves, killdeer, and turkey vultures. WS removed mourning doves and killdeer at airports where WS had identified those birds as posing a serious threat to aircraft safety during FY 2011. WS removed turkey vultures to alleviate threats to human health and safety and property damage. Shooting was the method employed by WS to remove birds during FY 2011.

Similar to activities conducted by WS during FY 2010, take of birds by WS in North Carolina during FY 2011 occurred within the parameters of take analyzed in the EA that determined those take levels would not adversely impact the populations of those species, except for the take of killdeer, mourning doves, common grackles, and brown-headed cowbirds. In addition, WS addressed bufflehead, Mississippi kites, sandhill cranes, upland sandpipers, sanderlings, Forster's terns, and merlin in FY 2011; however, the EA did not specifically address a need for action associated with those species. All take by WS occurred within take levels permitted by the USFWS under depredation permits issued to WS or to entities in which WS was acting as a subpermittee under the permit.

Bird Damage Management Conducted in North Carolina by WS during FY 2012

The WS program in North Carolina continued to respond to requests for bird damage management during FY 2012. WS responded to requests for assistance across a broad range of resources and bird species. Table 6 reflects the number of birds by species addressed by WS during FY 2012 to resolve damage to agricultural resources, natural resources, property, and to reduce threats to human health and safety. WS addressed at least 58 species of birds during FY 2012 to alleviate damage or threats of damage in the State.

Pursuant to the proposed action alternative, WS employed an integrated approach to managing damage associated with birds in the State when requested by a resource owner. Most requests for assistance were associated with aircraft strike hazards at airports and military bases within the State. The presence of birds in the immediate airspace of airports can pose a direct threat to aviation safety from the potential for strikes by aircraft. Aircraft striking birds can lead to costly repairs to aircraft, lost revenue from aircraft downtime, and can threaten human safety. Strikes can also lead to catastrophic failure of aircraft leading to crashes that threaten human safety. As part of the assistance request at airports, WS conducted a thorough investigation of the airport property and surrounding areas to identify potential attractants of birds. When employing an integrated approach to managing damage and threats of damage, WS used both lethal and non-lethal methods during FY 2012. After repeated use of non-lethal methods, birds often habituate to those methods and become non-responsive to the use of those methods. Therefore, lethal methods can enhance the effectiveness of non-lethal methods. In addition, employing lethal methods can remove birds that are posing immediate threats of damage or birds causing damage.

The three bird species with the highest level of take in FY 2012 were mourning doves, herring gulls, and brown-headed cowbirds. WS removed mourning doves and brown-headed cowbirds at airports where they were posing a serious threat to aircraft safety during FY 2012. Mourning doves and cowbirds are considered gregarious species (*i.e.*, form large flocks), especially during the migration periods. Large flocks of birds can increase risks associated with bird strikes since aircraft could strike multiple birds, which can increase damage to the aircraft. WS lethally removed herring gulls to reduce threats to ground nesting bird species from predation on barrier islands within North Carolina. Predation is a naturally occurring event but becomes a management issue when predation occurs on species experiencing severe population declines or during the restoration of waterbird breeding sites (Hunter et al. 2006, Schweitzer 2011).

Table 6 – Number and species of birds addressed in North Carolina by WS during FY 2012

Species	Dispersed	Take	Species	Dispersed	Take
Feral Geese	20	12	**Ruddy Turnstones**	16	0
Wood Duck	3	0	**Semipalmated Sandpiper**	7	0
Mallard	14	3	**Wilson's Snipe**	7	0
Hooded Merganser	142	0	**Laughing Gull**	14,700	73
Red-breasted Merganser	1	0	**Ring-billed Gull**	4,681	23
Northern Bobwhite	10	0	**Herring Gull**	438	309
Wild Turkey	102	5	**Great Black-backed Gull**	126	16
Pied-billed Grebe	3	0	**Least Tern**	0	2
Double-crested Cormorant	306	6	**Forster's Tern**	4	0
Brown Pelican	3	1	**Royal Tern**	18	3
American Bittern	1	0	**Sandwich Tern**	37	2
Great Blue Heron	72	14	**Mourning Dove**	2,231	758
Great Egret	7	16	**American Kestrel**	20	2
Cattle Egret	0	1	**Eastern Kingbird**	12	0
Green Heron	7	0	**American Crow**	293	10
White Ibis	11	0	**Fish Crow**	388	6
Black Vulture	732	13	**Horned Lark**	7	10
Turkey Vulture	2,281	168	**Northern Rough-winged Swallow**	85	1
Osprey	10	0	**Cliff Swallow**	70	0
Mississippi Kite	89	0	**Barn Swallow**	826	0
Bald Eagle	1	0	**Eastern Bluebird**	0	14
Northern Harrier	12	1	**American Robin**	94	0
Cooper's Hawk	3	0	**Northern Mockingbird**	19	52
Red-shouldered Hawk	7	1	**Red-winged Blackbird**	66	2
Red-tailed Hawk	121	1	**Eastern Meadowlark**	209	7
Black-bellied Plover	438	5	**Common Grackle**	85	23
Semipalmated Plover	27	0	**Brown-headed Cowbird**	2,079	192
Killdeer	470	72	**Blackbirds (mixed)**	1,700	0
Spotted Sandpiper	1	0	**House Finch**	145	69
Upland Sandpiper	23	22			

Take of birds by WS in North Carolina during FY 2012 occurred within the parameters of take analyzed in the EA that determined those take levels would not adversely impact the populations of those species, except for the take of herring gulls, mourning doves, Northern mockingbirds, common grackles, brown-headed cowbirds, and house finches. In addition, WS addressed red-breasted mergansers, Northern

bobwhite, pied-billed grebes, brown pelicans, American bitterns, Mississippi kites, upland sandpipers, ruddy turnstones, least terns, Forster's terns, sandwich terns, Eastern kingbirds, and Eastern bluebirds in FY 2012; however, the EA did not specifically address a need for action associated with those species. All take by WS occurred within take levels permitted by the USFWS under depredation permits issued to WS or to entities in which WS was acting as a subpermittee under the permit.

Population Impact Analysis of WS' Previous Activities and the Proposed Supplement to the EA

A common issue when addressing damage caused by wildlife are the potential impacts of management actions on the populations of target species. Non-lethal and lethal methods would be available to alleviate damage or threats to human safety. Non-lethal methods available can disperse or otherwise make an area unattractive to target species causing damage, which could reduce the presence of those species at the site and potentially the immediate area around the site. As stated previously, non-lethal methods have not been and would not be employed over large geographical areas or applied at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over such a wide geographical scope that long-term adverse effects would occur to a species' population. Therefore, WS and many people regard non-lethal methods as having minimal effects on overall populations of wildlife since individuals of those species are unharmed. The use of non-lethal methods previously by WS did not have adverse effects on target bird populations in the State.

Lethal methods are also available to remove a bird or those birds responsible for causing damage or posing threats to human safety. Therefore, if WS or other entities used lethal methods, the removal of a bird or birds could result in local population reductions in the area where damage or threats were occurring. The number of individuals from a target species removed from a population using lethal methods has been and would continue to be dependent on the number of requests for assistance received, the number of individual birds involved with the associated damage or threat, and the efficacy of methods employed.

To analyze damage management activities conducted by WS in the State and to communicate clearly to the public the potential individual and cumulative impacts of previous and future activities, WS has prepared this supplement to the EA. The analysis will measure the number of individuals lethally removed in relation to that species abundance to determine the magnitude of impact to the populations of those species from the use of lethal methods. Magnitude may be determined either quantitatively or qualitatively. Determinations based on population estimates, allowable harvest levels, and actual harvest data are quantitative. Determinations based on population trends and harvest trend data, when available, are qualitative. This supplement will evaluate the magnitude of previous and proposed activities by comparing the number of birds lethally removed with population estimates and trends, when available. WS would only use lethal methods at the request of a cooperator seeking assistance and only after the USFWS authorized the lethal removal of those bird species pursuant to the MBTA, when required. Table 4, Table 5, and Table 6 show WS' cumulative removal of birds to alleviate damage by species from FY 2010 through FY 2012, respectively.

As discussed previously, the number of birds removed annually using lethal methods would be dependent on the number of requests for assistance received, the number of birds involved with the associated damage or threat, and the efficacy of methods employed. The EA evaluated the maximum number of birds of each species that WS could lethally remove annually as part of an integrated approach pursuant to the proposed action alternative. The EA evaluated the annual lethal removal of birds based on anticipated needs using activities conducted by WS previously as a guide. Through the evaluation conducted in the EA, the levels of annual lethal removal of birds to alleviate damage discussed in the EA would be of low magnitude based on available population information and trend data for those target species. As part of the SOPs discussed in Chapter 3 of the EA, WS has annually monitored activities conducted since the

signing of the Decision and FONSI. Through monitoring efforts conducted from FY 2010 through FY 2012, WS has identified lethal removal activities associated with killdeer, herring gulls, mourning doves, Northern mockingbirds, common grackles, brown-headed cowbirds, and house finches that have exceeded the annual lethal removal levels evaluated in the EA. In addition, WS has identified additional bird species addressed from FY 2010 through FY 2012 that the EA did not specifically address. Those species WS addressed from FY 2010 through FY 2012 that the EA did not address include bufflehead, red-breasted mergansers, Northern bobwhite, pied-billed grebes, brown pelicans, American bitterns, snowy egrets, Mississippi kites, sandhill cranes, upland sandpipers, ruddy turnstones, sanderlings, Bonaparte's gulls, least terns, Forster's terns, sandwich terns, merlin, Eastern kingbirds, Eastern bluebirds, and brown thrashers. WS also anticipates additional efforts associated with ring-billed gulls, great black-backed gulls, and turkey vultures. The following subsection of this supplement will further address activities conducted by WS associated with those species.

BROWN PELICAN BIOLOGY AND POPULATION IMPACT ANALYSIS

With their dark feather coloration, large body, long bill, and their large gular pouch, the brown pelican is a conspicuous waterbird. The brown pelican is a coastal marine species found along the coasts from central North America into northern South America, with breeding and wintering populations occurring in North Carolina (Shields 2002). Brown pelicans primarily feed on marine fish and people often recognize them for their headfirst dives into the water to capture prey, often diving down from as high as 65 feet (Shields 2002). Brown pelicans typically forage in the shallow waters near the coastline along beaches, sandbars, docks, and dredge-spoil islands but will forage on inland waters (Shields 2002). Due to many factors, including overharvest, pesticide use, and fisheries collapse, the USFWS designated the brown pelican as endangered under the Endangered Species Act in 1970 across the entire range of the species in the United States (Shields 2002; see 50 FR 4938-4945). Due in part to less drastic declines in the population observed along the Atlantic Coast, the population of pelicans in those areas, including populations in North Carolina, were delisted in 1985 (see 50 FR 4938-4945). The USFWS removed populations elsewhere in the United States from the list in 2009 (see 74 FR 59444-59472). Today, the USFWS no longer lists populations of brown pelicans under the Endangered Species Act; however, the MBTA continues to afford brown pelicans protection from take unless permitted by the USFWS.

In North Carolina, the number of brown pelicans observed in areas surveyed during the Breeding Bird Survey (BBS) have shown an increasing trend between 1966 and 2011, which has been estimated to be a 7.8% annually increase (Sauer et al. 2012). Between 2001 and 2011, the number of brown pelicans observed in areas of the State surveyed has increased 7.5% annually (Sauer et al. 2012). Across all routes surveyed during the BBS in the United States, the number of pelicans observed has increased 5.4% annually since 1966, with a 13.0% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region[8], the number of pelicans observed along routes surveyed during the BBS show an annual increase estimated at 2.7% since 1966, with a 3.2% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). During surveys conducted in 2011, observers counted 5,150 brown pelican nests in areas of the State surveyed, which was 52% higher than the 11-year average and was the second highest nest count (Schweitzer 2011). Observers have counted an average of 3,394 pelican nests annually during the previous 11-year colonial waterbird surveys. The number of pelican nests observed during the 2011 survey exceeded the population goal for pelicans of 4,000 nests and the 11 nesting sites exceeded the habitat goal of pelicans nesting at five sites (Schweitzer 2011).

[8]The southeastern coastal plain, also known as Bird Conservation Region 27, overlaps areas of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and small parts of Louisiana, Tennessee, and Kentucky. Extensive riverine swamps and marsh complexes along the Atlantic Coast characterize this region. The region also includes the interior forests dominated by longleaf, slash, and loblolly pine forests. In North Carolina, the eastern portion of the State occurs in the southeastern coastal plain.

Across the southeastern United States, the breeding population of brown pelicans has been estimated at 42,551 breeding pairs, with 14,600 pairs occurring in the southeastern coastal plain region, 9,527 pairs occurring in Peninsular Florida, and 18,424 breeding pairs occurring elsewhere in the southeast (Hunter et al. 2006). The population objective for the southeastern United States is to maintain 40,000 to 60,000 breeding pairs of brown pelicans (Hunter et al. 2006).

The number of pelicans observed in the State during the Christmas Bird Count (CBC) has shown an increasing trend since 1966; however, recent downward trends have been observed since early 2000 (National Audubon Society 2010). Between 2002 and 2011, observers have counted on average 6,171 brown pelicans in areas surveyed during the CBC, ranging from a high of 14,725 pelicans observed in 2005 to a low of 2,535 pelicans during 2010.

Of the five tiers of action levels for waterbirds outlined in the Southeast United States Waterbird Conservation Plan, Hunter et al. (2006) assigned brown pelicans to the "*planning and responsibility*" tier, which included bird species that require some level of planning to maintain sustainable populations in the region. The planning and responsibility tier is the second lowest tier in terms of action priority ahead of only the last tier, which includes those waterbirds that Hunter et al. (2006) considered above management levels. The North American Waterbird Conservation Plan classified the brown pelican in a category of conservation concern considered as "*moderate*" (Kushlan et al. 2002). No current population estimates are available for the number of brown pelicans residing in the State at any given time.

Brown pelicans are highly social during all seasons and often nest, roost, fly, and forage in groups (Shields 2002). This gregarious behavior and their large size can increase aircraft strike risks at airports within the State, especially airfields located near marine environments. Most requests for assistance received by WS involving brown pelicans would be associated with aircraft strike risks. WS did not receive requests for assistance associated with brown pelicans in FY 2010 and FY 2011. However, WS received a request to reduce aircraft strike risks associated with pelicans during FY 2012. To address that request for assistance associated with aircraft strike hazards, WS dispersed three pelicans using non-lethal dispersal methods and employed firearms to remove one pelican during FY 2012. During FY 2013, preliminary data shows that WS dispersed 141 pelicans to alleviate strike hazards at airfields and employed lethal methods to remove six pelicans[9].

Based on the number of brown pelicans addressed previously and in anticipation of additional efforts, WS could lethally remove up to 10 brown pelicans annually within the State to alleviate damage or threats of damage. As stated previously, the USFWS no longer considers the brown pelican as an endangered species under the Endangered Species Act; however, the MBTA affords brown pelicans protection from take unless permitted by the USFWS. Therefore, any lethal removal by WS would occur pursuant to the MBTA through the issuance of a depredation permit by the USFWS authorizing the take of pelicans. If the USFWS did not issue a permit, no lethal removal would occur. WS anticipates continuing to address brown pelicans using primarily non-lethal harassment methods; however, if pelicans habituate to non-lethal methods or pose an immediate threat of an aircraft strike, WS could employ lethal methods to alleviate strike risks.

If two adult pelicans were associated with each nest counted during the 2011 colonial waterbird surveys, the breeding population in the State would be 10,300 pelicans. Similarly, if two adult were associated with each of the average 3,394 nests observed annually during the 11-year survey, the average breeding population would be 6,788 pelicans. The statewide breeding population goal for North Carolina is 4,000

[9]Data for FY 2013 is preliminary and subject to change.

nests or 8,000 pelicans (Schweitzer 2011). If WS removed 10 pelicans, the removal would represent 0.1% of the breeding population in 2011, 0.2% of the average breeding population over the 11 years of the survey, and 0.1% of the statewide population objective.

If WS removed up to 10 pelicans, the removal would represent 0.2% of the average number of pelicans observed in areas surveyed during the CBC from 2002 through 2011. When compared to the lowest number of pelicans observed in areas surveyed from 2002 to 2011 during the CBC, removal of up to 10 pelicans would represent 0.4% of the lowest number observed. The data from the CBC provides an indication of long-term trends in the number of birds observed wintering in areas surveyed. Based on the survey parameters of the CBC, the data does not represent statewide population estimates of wintering bird populations. However, to evaluate the magnitude of lethal removal activities that could occur by WS, this analysis compares the number of pelicans observed in areas of the State surveyed during the CBC with the proposed annual removal that could occur by WS. Data from the CBC would be a minimum estimate given the survey parameters of the CBC and the survey only covering a small portion of the State.

The lethal removal of brown pelicans by WS to alleviate damage risks would only occur when authorized by the USFWS and only at levels permitted. WS would continue to address pelicans using primarily non-lethal methods. The lethal removal of pelicans would only occur when non-lethal dispersal methods were ineffective at alleviating damage or reducing the risk of damage or when pelicans posed an immediate risk to aircraft and human safety.

TURKEY VULTURE BIOLOGY AND POPULATION IMPACT ANALYSIS

Turkey vultures occur throughout Mexico, across most of the United States, and along the southern tier of Canada (Wilbur 1983, Rabenhold and Decker 1989) and occur throughout the year in North Carolina (Kirk and Mossman 1998). Although turkey vultures occur in virtually all habitats, they are most abundant where open land interrupts forested areas (Brauning 1992). Turkey vultures nest on the ground in thickets, stumps, hollow logs, or abandoned buildings (Walsh et al. 1999). Turkey vultures often roost in large groups near homes or other buildings where they can cause property damage from droppings or by pulling and tearing shingles. Turkey vultures prefer carrion but will eat virtually anything, including insects, fish, tadpoles, decayed fruit, pumpkins, and recently hatched heron and ibis chicks (Brauning 1992). Turkey vultures can live up to 16 years of age (Henny 1990).

The statewide population of turkey vultures is currently unknown; however, the Partners in Flight Science Committee (2013) estimated the statewide breeding population at 110,000 turkey vultures using BBS data. According to BBS trend data provided by Sauer et al. (2012), the number of turkey vultures observed along routes in North Carolina has shown an increasing trend estimated at 7.5% annually from 1966 through 2011, with an 8.5% annual increase occurring from 2001 through 2011. In the southeastern coastal plain region, the number of turkey vultures observed along routes surveyed during the BBS show an increasing trend estimated at 4.8% since 1966, with a 5.3% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). Trending data from the BBS indicates the number of turkey vultures observed along BBS routes surveyed in the United States have shown an increasing trend estimated at 2.3% annually, with a 3.0% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). The number of turkey vultures observed in areas of the State surveyed during the CBC has shown an increasing trend since 1966 (National Audubon Society 2010).

The MBTA prohibits the take of turkey vultures except when the USFWS authorizes the take through the issuance of a depredation permit. Table 7 shows the number of turkey vultures addressed in North Carolina by all entities issued depredation permits to alleviate damage. From FY 2010 through FY 2012, the WS program in North Carolina lethally removed 342 turkey vultures in the State. WS employed non-

lethal methods to disperse 5,479 vultures from FY 2010 through FY 2012, which represents over 94% of the vultures WS addressed.

Table 7 - Number of Turkey Vultures addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	1,874	68	116
2011	1,324	106	157
2012	2,281	168	152
TOTAL	**5,479**	**342**	**425**

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

Based on requests for assistance received when the EA was developed, the EA evaluated the need to remove up to 200 turkey vultures annually to alleviate damage. As the population of turkey vultures in the State has increased, the number of requests for assistance to alleviate damage associated with turkey vultures has also increased. Based on current population trends for turkey vultures in the State, the number of requests for assistance with managing damage associated with turkey vultures and the number of vultures that WS could address to meet those requests is likely to increase. Since the completion of the EA, the number of requests for assistance received by WS to manage damage caused by turkey vultures increased from FY 2010 through FY 2012, primarily at airports. As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods as described in the EA, the annual take of turkey vultures to alleviate damage is also likely to increase during the implementation of the proposed action. Therefore, based on previous requests for assistance and in anticipation of additional efforts and the subsequent need to address more vultures, WS could lethally remove up to 300 turkey vultures annually to alleviate damage and threats.

If WS lethally removed up to 300 turkey vultures annually, the removal would represent 0.3% of the estimated statewide population of turkey vultures if the population remains at least stable. From 2010 through 2012, all entities issued depredation permits in the State lethally removed 425 vultures, which is an average of 142 vultures removed annually. If the average number of vultures removed annually continued to occur annually, the cumulative removal could reach a high of 442 vultures, which would represent 0.4% of the estimated statewide breeding population estimated at 110,000 vultures. The highest annual removal from 2010 through 2012 occurred in 2011 when all entities removed 157 vultures. Based on the highest removal by all entities, the cumulative take could reach 457 vultures, which would continue to represent 0.4% of the estimated statewide breeding population. The permitting of the take by the USFWS pursuant to the MBTA ensures take by WS and by other entities occurs within allowable take levels to achieve the desired population objectives for turkey vultures in the State.

KILLDEER BIOLOGY AND POPULATION IMPACT ANALYSIS

Killdeer occur over much of North America from the Gulf of Alaska southward throughout the United States with their range extending from the Atlantic coast to the Pacific coast (Hayman et. al. 1986, Jackson and Jackson 2000). Although killdeer are technically in the family of shorebirds, they are unusual shorebirds in that they often nest and live far from water. Killdeer are commonly found in a variety of open areas, even concrete or asphalt parking lots at shopping malls, as well as fields and beaches, ponds, lakes, roadside ditches, mudflats, airports, pastures, and gravel roads and levees but seldom occur in large flocks. Jackson and Jackson (2000) describe the nesting habitat of killdeer as open areas with grass or forbs less than 1 cm tall. Nesting can occur on sandbars, mudflats, pastures, cultivated fields, airports, golf courses, parking lots, and graveled rooftops (Jackson and Jackson 2000).

Since 1966, the number of killdeer observed during the breeding season in the State has shown an increasing trend estimated at 6.1% annually, with a 3.6% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). BBS data currently indicates an increasing trend in the southeastern coastal plain region estimated at 1.8% annually since 1966, with a 2.0% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). Killdeer observed across all BBS routes surveyed in the United States are showing a slightly decreasing trend estimated at -0.5% annually since 1966, with a 0.1% increase occurring from 2001 through 2011(Sauer et al. 2012). Survey data from the CBC indicates the number of killdeer overwintering in the State has shown a general increasing trend since 1966 (National Audubon Society 2010). The current population of killdeer in the State is unknown. Based on broad-scale surveys, the United States Shorebird Conservation Plan estimated the population of killdeer in the United States to be approximately 2 million birds during 2001 (Brown et al. 2001).

Similar to the other bird species addressed in this supplement, requests for assistance to manage damage and threats associated with killdeer in North Carolina occur primarily at airports where killdeer can pose aircraft strike risks. Airports often provide ideal nesting habitat for killdeer with nesting often occurring along the edges of runways and taxiways. In the United States, reported civil aircraft strikes involving killdeer have caused nearly $4 million in damage between 1990 and 2012 (Dolbeer et al. 2013). Based on requests for assistance received when the EA was developed, the EA evaluated the need to remove up to 100 killdeer annually to address requests for assistance. To address previous requests for assistance associated with killdeer, WS employed an integrated methods approach using lethal and non-lethal methods to alleviate damage or threats of damage. From FY 2010 through FY 2012, WS lethally removed 287 killdeer in the State at airports to reduce damages and threats associated with aircraft strikes (see Table 8), which is an average annual removal of 96 killdeer. During FY 2011, WS lethally removed 115 killdeer, which exceeded the level evaluated in the EA. In addition to employing lethal methods, WS employed non-lethal methods to disperse 1,770 killdeer between FY 2010 and FY 2012, which is an average of 590 killdeer dispersed. WS dispersed over 86% of the killdeer addressed between FY 2010 and FY 2012. All entities issued depredation permits by the USFWS reported lethally removing 289 killdeer in the State from FY 2010 through FY 2012.

Table 8 – Number of killdeer addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	424	100	123
2011	876	115	96
2012	470	72	70
TOTAL	**1,770**	**287**	**289**

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

As additional airports request assistance with managing threats and damage associated with aircraft potentially striking killdeer, the number of killdeer addressed by WS annually is also likely to increase. Based on the need for additional efforts to manage strike risks caused by killdeer, WS could lethally remove up to 200 killdeer annually and up to 20 nests with eggs annually. With a relative abundance estimated at 1.5 killdeer per route in North Carolina (Sauer et al. 2012), the killdeer population could be estimated at nearly 7,300 birds based on the land area of the State.

Using a breeding killdeer population estimated at 7,300 birds in North Carolina and if WS lethally removed 200 killdeer, WS' removal would represent 2.7% of the estimated statewide breeding population. All entities issued depredation permits in the State reported removing 289 killdeer from 2010 through 2012, which is an average of 96 killdeer removed annually. If other entities removed 96 killdeer

and if WS removed 200 killdeer, the cumulative removal would represent 4.1% of a statewide breeding population estimated at 7,300 killdeer. The cumulative removal of killdeer likely represents a smaller percentage of the actual breeding population since the statewide breeding population likely exceeds 7,300 killdeer. The permitting of the take by the USFWS also ensures any cumulative take occurs within allowable harvest levels.

Additionally, impacts due to nest and egg destruction should have little adverse effect on the killdeer breeding population in the State. WS and many other people consider nest destruction to be a non-lethal method. In addition, many people consider egg destruction to be a non-lethal method when conducted before the development of an embryo. Regular human disturbance and low reproductive success often cause birds to relocate and nest elsewhere when confronted with repeated nest failure. Although there may be reduced fecundity for the individuals affected by nest destruction, this activity would not have a long-term effect on breeding adult killdeer based on the limited number of nests that WS could destroy annually. The destruction of up to 20 killdeer nests annually by WS would occur in localized areas where nesting takes place and would not reach a level where adverse effects on killdeer populations would occur. As with the lethal removal of killdeer, the USFWS must authorize the destruction of nests and eggs. Therefore, the number of nests and eggs WS destroys annually would occur at the discretion of the USFWS.

UPLAND SANDPIPER BIOLOGY AND POPULATION IMPACT ANALYSIS

Unlike most shorebirds that are associated with water, upland sandpipers are associated with grassland habitats (Houston et al. 2011). Upland sandpipers occur during the breeding season across south central Canada and the northern United States extending from the Rocky Mountains across the Great Lakes region into the northeastern United States. Isolated breeding populations also occur in the high-altitude meadows west of the Rocky Mountains with breeding populations also occurring in Alaska and extreme northwest Canada (Houston et al. 2011). Populations likely expanded eastward as settlers cleared forests for agricultural purposes and was a locally common breeder in the northeastern United States around the 1860s. However, populations soon began a rapid decline from excessive market hunting and habitat loss across their breeding and wintering range (Houston et al. 2011). Although populations began to rebound following a prohibition on hunting sandpipers in the early 1900s, populations have not reached prior levels as habitat loss accelerated due to the conversion of native grasslands to farmland, changes in agricultural practices, and human development (Houston et al. 2011). Today, some of the largest breeding populations in the northeastern United States occur at airports (Houston et al. 2011).

Upland sandpipers generally begin arriving on their breeding grounds in April and depart by August after chicks have fledged (Houston et al. 2011). Upland sandpipers nest in loose colonies and feed, rest, and fly in small groups (Houston et al. 2011). As soon as hatchlings are able to fly, birds begin to form small flocks of 10 to 25 individuals (Houston et al. 2011). Their diet consists primarily of invertebrates, mostly insects (Houston et al. 2011). Across all routes surveyed during the BBS, the number of upland sandpipers observed has shown an annual increasing trend estimated at 0.5% since 1966, with a 1.3% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). Along routes surveyed during the BBS in the United States, the number of upland sandpipers are showing increasing trends estimated at 0.6% annually since 1966, with a 1.1% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). However, the number of upland sandpipers observed along all routes surveyed across the eastern United States have shown declining trends estimated at -3.5% annually since 1966 and -2.2% annually between 2001 and 2011 (Sauer et al. 2012). Brown et al. (2001) ranked the upland sandpiper as a "*species of high concern*" and estimated the upland sandpiper population to be 350,000 birds with a target population objective of 470,000 birds. Hunter et al. (2002) estimated the upland sandpiper population in the southeastern coastal plain and the Caribbean to be 10,500 sandpipers and assigned a "*high*" priority level to sandpipers in the region.

Upland sandpipers migrate through North Carolina during the spring and fall, with no known breeding or wintering populations occurring in the State (LeGrand et al. 2013). During the migration periods, upland sandpipers found in North Carolina occur in short to medium grass in upland habitats, such as pastures, grasslands at airports, large lawns, and large turf farms (LeGrand et al. 2013). Upland sandpipers tend to migrate through the State inland more during the spring and more toward the coast during the fall migration (LeGrand et al. 2013). The peak period for sandpipers passing through the State during the spring migration appears to be mid-April while the peak periods during the fall occur from late July through early September (LeGrand et al. 2013). However, LeGrand et al. (2013) considers sandpipers rare to locally uncommon in the State during the migration periods, depending on the migration period and location. Sandpipers are most common in the fall along the Tidewater and coastal areas of the State, with the biggest concentrations occurring at airports in late summer and early fall (LeGrand et al. 2013). However, the number of upland sandpipers that migrate through the State annually is unknown.

Requests for assistance associated with upland sandpipers occur primarily at airports where they pose a hazard to aircraft. From FY 2010 through FY 2012, WS lethally removed 39 sandpipers and used non-lethal methods to disperse 30 sandpipers to alleviate damage and threats at airports in the State. During FY 2012, WS addressed 22 upland sandpipers using lethal methods and 23 sandpipers using non-lethal dispersal methods, which represented the highest number of sandpipers addressed by WS from FY 2010 through FY 2012. The USFWS did not issue depredation permits to other entities for the removal of upland sandpipers from 2010 to 2012 (C. Simonton, USFWS, pers. comm. 2013). WS anticipates continuing to receive requests for assistance from air facilities where upland sandpipers are posing a strike risk to aircraft. Based on previous requests for assistance and in anticipation of additional efforts, WS could lethally remove up to 30 upland sandpipers annually to alleviate damage and threats when non-lethal techniques are unsuccessful.

Upland sandpipers are present in the State during the migration periods and the number of sandpipers present in North Carolina fluctuates. The best available data estimates that the population of upland sandpipers in North America is approximately 350,000 birds (Brown et al. 2001, Hunter et al. 2002). In the southeastern coastal plain region, Hunter et al. (2002) estimated the upland sandpiper population at 10,500 birds. Currently, no other data is available on upland sandpiper populations in North Carolina or in the southeastern coastal plains region, including trend information from the BBS or the CBC (National Audubon Society 2010, Sauer et al. 2012). The lethal removal of up to 30 sandpipers by WS to alleviate aircraft strike risks would represent 0.01% of the estimated population in North America and 0.3% of the population estimated in the southeastern coastal plain region. The lethal removal of upland sandpipers would only occur when authorized by the USFWS and only at permitted levels.

BONAPARTE'S GULL BIOLOGY AND POPULATION IMPACT ANALYSIS

Bonaparte's gulls are a small gull characterized by their size, pink legs, and black beak (Burger and Gochfeld 2002). Bonaparte's gulls nest in trees of sparsely wooded areas around ponds, bogs, and bays in the taiga and boreal forests of Alaska and northern Canada (Burger and Gochfeld 2002). Bonaparte's gulls are an abundant migrant and winter visitor over much of North America with large flocks occurring in the coastal areas close to human activity. The gulls will also frequent inland lakes and rivers, coastal bays, estuaries, and inshore waters where aquatic organisms comprise a large portion of their diet (Burger and Gochfeld 2002). The spring migration begins in mid-March and continues through the end of May while the fall migration begins in late-July and can continue through January (Burger and Gochfeld 2002). Freezing inland waters during the winter often pushes Bonaparte's gulls further south and toward the coastal areas (Burger and Gochfeld 2002). Non-breeding gulls often linger south of the breeding range during the nesting season (Burger and Gochfeld 2002). Like most gulls, Bonaparte's gulls are

highly social. Bonaparte's gulls form flocks in the tens of thousands to migrate, roost, and forage during the nonbreeding season (Burger and Gochfeld 2002).

LeGrand et al. (2013) classified Bonaparte's gulls as transient and a winter resident in North Carolina. During the winter, Bonaparte's gulls occur near the coastal areas of the State, but also occur inland sporadically at larger reservoirs (LeGrand et al. 2013). Peak numbers of gulls along the coast occur in February and March, with peak counts of up to 20,000 gulls occurring (LeGrand et al. 2013). There are no breeding colonies of Bonaparte's gulls in North Carolina. The number of Bonaparte's gulls present in the State during the winter is unknown. The number of Bonaparte's gulls observed in areas surveyed during the CBC conducted annually in the State has shown a cyclical pattern since 1966 but an overall general increasing trend (National Audubon Society 2010). The cyclical pattern is likely a result of the severity of winters and the availability of open water for foraging. Given the gulls isolated breeding location and wide winter distribution, population information is limited. Burger and Gochfeld (2002) indicated the population has "*increased greatly in numbers since early 1990s*". The Mid-Atlantic, New England, Maritimes Waterbird Conservation Plan (2006) estimated the total population of Bonaparte's gulls at 255,000 to 525,000 gulls and assigned a conservation rank of "*moderate concern*" to the total population in North America. The International Union for Conservation of Nature (IUCN) ranks Bonaparte's gulls in a category of "*least concern*" based on their wide geographical distribution, increasing population trend, and large population estimate (IUCN 2013).

Since the completion of the EA, WS has received requests for assistance associated with Bonaparte's gulls at air facilities in the State. In FY 2010, WS dispersed two Bonaparte's gulls using non-lethal methods to alleviate aircraft strike risks. No other activities associated with Bonaparte's gulls occurred by WS. Although requests for assistance associated with Bonaparte's gulls have been infrequent previously, WS could receive additional requests for assistance. Data from the CBC indicates Bonaparte's gulls present in areas of the State surveyed are generally increasing (National Audubon Society 2010); therefore, as populations increase, WS could receive additional requests to address gulls when they pose a strike hazard at airfields in the State. In anticipation of receiving requests for assistance, WS would continue to employ an integrated methods approach using non-lethal and lethal methods. As stated previously, WS would not employ non-lethal methods at such intensity that adverse effects would occur to the population of Bonaparte's gulls.

To address requests for assistance to manage damage and threats associated with Bonaparte's gulls in the future, WS could remove up to 25 Bonaparte's gulls annually as part of an integrated approach. As stated previously, the number of Bonaparte's gulls present in the State likely fluctuates throughout the year. The best available data estimates the population of Bonaparte's gulls in North America at 255,000 to 525,000 gulls (Mid-Atlantic, New England, Maritimes Waterbird Conservation Plan 2006). Based on this estimate, the annual removal of up to 25 Bonaparte's gulls by WS under the proposed action alternative would represent 0.005% to 0.01% of that population. The lethal removal of Bonaparte's gulls can only occur when permitted by the USFWS through the issuance of depredation permits. Therefore, the USFWS must authorize all take, including take by WS, and would occur at the discretion of the USFWS. The take of Bonaparte's gulls would only occur at levels authorized by the USFWS.

RING-BILLED GULL BIOLOGY AND POPULATION IMPACT ANALYSIS

Ring-billed gulls are medium sized gulls characterized by a black band or ring that runs vertically around the bird's bill (Pollet et al. 2012). Breeding populations of ring-billed gulls occur across southern Canada and the northern portion of the United States. Nests occur on the ground near water in areas with sparse vegetation, with a preference for nesting on islands but they also nest on peninsulas of freshwater lakes (Pollet et al. 2012).

Currently there are no known breeding ring-billed gull colonies in North Carolina (Schweitzer 2011); however, non-breeding ring-billed gulls occur in the State during the breeding season (Pollet et al. 2012, LeGrand et al. 2013). LeGrand et al. (2013) considers ring-billed gulls to be transient and a winter resident throughout most of the State. Ring-billed gulls are one of the most abundant bird species present in the State during the winter, with populations occurring primarily in areas near large water sources of the State, especially along the coast (LeGrand et al. 2013). The highest concentrations of gulls occur from September through May in the State, with a peak count of 500,000 gulls occurring in late December along the coast (LeGrand et al. 2013). Ring-billed gulls can also occur along the coast and inland at agricultural fields, on golf courses, at landfills, and shopping malls throughout the State (Pollet et al. 2012, LeGrand et al. 2013).

In 1984, the population of ring-billed gulls in the Great Lakes region was approximately 648,000 pairs (Blokpoel and Tessier 1986). Blokpoel and Tessier (1992) found that the nesting population of ring-billed gulls in the Canadian portion of the lower Great Lakes system increased from 56,000 pairs to 283,000 pairs from 1976 through 1990. Across all BBS routes surveyed in the United States, the number of ring-billed gulls observed has shown an increasing trend estimated at 3.0% since 1966, with a 7.1% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region, the number of ring-billed gulls observed in areas surveyed during the BBS has shown a decreasing trend estimated at -0.8% annually since 1966, with a -0.2% annual decline occurring from 2001 through 2011. In North Carolina, the number of ring-billed gulls observed in areas of the State surveyed during the BBS has shown a declining trend estimated at -2.0% since 1966, with a -3.5% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). The ring-billed gulls observed during the BBS conducted in the State are likely non-breeding gulls since no known breeding colonies occur in the State.

The number of ring-billed gulls observed in areas surveyed during the CBC has shown a general stable to slightly increasing trend in the State since 1966 (National Audubon Society 2010). Between 2002 and 2011, observers have counted an average of 88,116 ring-billed gulls in areas surveyed during the CBC. The highest count during the CBC conducted between 2002 and 2011 occurred in 2010 when observers counted 123,675 gulls. The lowest number of gulls observed in areas surveyed during the CBC conducted from 2002 through 2011 occurred in 2007 when participants counted 55,708 gulls (National Audubon Society 2010).

From FY 2010 to FY 2012, the WS program in North Carolina addressed 29,428 gulls using non-lethal dispersal methods to alleviate damage. In addition, WS employed lethal methods to remove 141 ring-billed gulls in the State from FY 2010 through FY 2012 (see Table 9). In addition, the USFWS issued depredation permits to other entities in the State to alleviate damage or threats of damage associated with ring-billed gulls. From 2010 through 2012, all entities issued depredation permits by the USFWS removed 404 ring-billed gulls in the State.

Table 9 – Number of ring-billed gulls addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	8,187	63	115
2011	16,560	55	172
2012	4,681	23	117
TOTAL	**29,428**	**141**	**404**

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

The EA addressed damage and threats associated with ring-billed gulls (USDA 2010). To reduce threats and damages associated with ring-billed gulls using an integrated approach during implementation of the

proposed action, the EA evaluated the lethal removal of up to 200 ring-billed gulls by WS annually in addition to the dispersal of gulls using non-lethal methods. As discussed previously, the EA evaluated activities under the proposed action alternative based on previous requests for assistance and in anticipation of additional requests for assistance. WS continues to receive requests for assistance to manage damage and threats of damage associated with ring-billed gulls, primarily at airports. As stated previously, WS addressed 19,242 ring-billed gulls to alleviate damage or threats of damage between FY 2004 and FY 2009, which represents an average of 3,207 gulls addressed by WS annually. WS addressed 29,569 ring-billed gulls between FY 2010 and FY 2012, which represents an average of 9,856 gulls addressed annually and a 207% increase over the average number of gulls addressed by WS from FY 2004 through FY 2009.

During implementation of the proposed action alternative, WS could employ a combination of both lethal and non-lethal methods in an integrated approach to resolve damage and threats. WS anticipates the number of gulls harassed using non-lethal methods and the number of gulls lethally removed could increase annually based on those increasing requests for assistance. Based on previous requests and the potential for additional requests for assistance, WS' lethal removal of gulls could increase to 300 gulls annually. If WS removed up to 300 gulls annually, the lethal removal would represent 0.2% to 0.5% of the number of gulls observed in areas surveyed during the CBC from 2002 through 2011 and would represent 0.3% of the average number of ring-billed gulls observed.

Data from the CBC provides an indication of long-term trends associated with birds observed wintering in areas surveyed and the data does not represent population estimates of wintering bird populations. However, this supplement to the EA evaluates the number of birds observed in areas surveyed during the CBC to analyze the magnitude of potential impacts associated with the lethal removal of birds. The number of birds observers count in areas surveyed during the annual CBC would represent a minimum estimate given the survey parameters of the CBC and the survey only covering a small portion of the State.

From 2010 through 2012, all entities issued depredation permits by the USFWS lethally removed 404 ring-billed gulls in the State, which is an average of 135 gulls taken annually. If WS lethally removed 300 gulls from FY 2010 through FY 2012, the average annual take by all entities could have increased to approximately 450 gulls removed per year in the State. Therefore, the cumulative take of gulls in the State, if WS had removed 300 gulls per year, would represent 0.3% of the average number of gulls observed in the State during the CBC from 2002 through 2011. The highest level of take occurred in 2011 when all entities lethally removed 172 ring-billed gulls in the State. Combining the proposed removal of up to 300 gulls by WS with the highest number of gulls lethally removed from 2010 through 2012, the cumulative removal would represent 0.5% of the average number of gulls observed during the CBC from 2002 through 2011 and 0.8% of the lowest number of gulls observed.

HERRING GULL BIOLOGY AND POPULATION IMPACT ANALYSIS

Herring gulls are the most widely distributed gulls in the Northern Hemisphere. In the United States, herring gulls occur along the Atlantic coast from North Carolina north across northern New England and along the Great Lakes during the breeding season (Pierotti and Good 1994). During the non-breeding season, herring gulls occur along the Atlantic, Gulf, and Pacific coasts (Pierotti and Good 1994). As well as northward from the Gulf of Mexico along the Mississippi, Ohio and Columbia Rivers and west along the Pecos, Red, Cimarron, Arkansas, Platte and Missouri Rivers (Pierotti and Good 1994). During the breeding season herring gulls use areas such as bays, estuaries, lakes, rivers, rocky or sandy coasts, islands, cliffs, building roofs, or break walls for nesting (Pierotti and Good 1994, Mid-Atlantic, New England, Maritimes Waterbird Conservation Plan 2006). During the non-breeding season, herring gulls occur in coastal areas as well as in agricultural fields, at landfills, around picnic areas, or at fish-

processing plants (Pierotti and Good 1994). Herring gulls will also use parking lots, fields, helipads, and airport runways as roosting and loafing sites (Pierotti and Good 1994). Herring gulls are social birds that nest in colonies and roost, loaf, and forage in groups (Pierotti and Good 1994). Herring gulls, like most gulls, are opportunistic feeders consuming fish, insects, marine invertebrates, other adult birds, the eggs and young of other birds, as well as carrion and human refuse (Pierotti and Good 1994).

Along the coastal areas of the State, LeGrand et al. (2013) considers herring gulls to be a resident throughout the year, with migratory movements occurring. LeGrand et al. (2013) stated nesting herring gulls were "*fairly common to locally common, and increasing…along the coast*". Historically, the nesting range of herring gulls and great black-backed gulls included the Canadian Maritimes region. However, herring gulls and great black-backed gulls have expanded their breeding range since the 1980s into Virginia and North Carolina (Hunter et al. 2006, Schweitzer 2011). Hunter et al. (2006) considers North Carolina the southern limit of the Atlantic Coast nesting range of herring gulls; however, populations of herring gulls have been expanding their range in North Carolina and increasing in numbers. Hunter et al. (2006) estimated the breeding population of herring gulls in North Carolina at 1,000 breeding pairs. Since 1977, various entities have conducted a periodic coast-wide survey of colonial-nesting waterbirds in North Carolina. In total, entities have conducted 11 waterbird surveys in the State, with the most recent survey completed in 2011. During the 2011 survey, observers counted 682 herring gull nests in areas surveyed, which was an increase relative to the estimate from the previous coast-wide survey conducted in 2007. Non-breeding gulls are also likely present in the State during the breeding season. The number of herring gulls observed is areas of the State surveyed during the BBS has shown an increasing trend since 1966 estimated at 4.7% annually, with a 3.8% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). Across the southeastern coastal plain region, the number of herring gulls observed in areas surveyed during the BBS has increased 2.2% annually since 1966, with a 3.5% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). However, the number observed along all routes surveyed in the eastern BBS region has shown annual declining trends since 1966 estimated at -3.7%, with a -4.5% annual decline occurring from 2001 through 2011 (Sauer et al. 2012).

LeGrand et al. (2013) considers herring gulls to be a winter resident/visitor elsewhere in the State, primarily around large reservoirs and landfills. Large numbers of herring gulls begin arriving in the State during October as birds from further north begin arriving. Peak counts along the coast have exceeded 100,000 herring gulls and generally occur from December through February, with high counts often correlated with the severity of winter further north (LeGrand et al. 2013). Trend data from the CBC indicates the number of gulls observed in areas surveyed have shown a general declining trend since 1966 (National Audubon Society 2010).

Herring gulls can be aggressive predators on many species (Guillemette and Brousseau 2001, Hunter et al. 2006, LeGrand et al. 2013), including being major predators of tern, skimmers, and oystercatchers (Hunter et al. 2006, LeGrand et al. 2013). LeGrand et al. (2013) stated, the breeding population of herring gulls "*…has been expanding, to the detriment of other, smaller coastal nesting waterbirds. Where Herring Gulls and Great Black-backed Gulls nest, terns and Black Skimmers avoid these islands, as the gulls at times feed on eggs and chicks of these species, as well as eggs and chicks of various shorebirds, such as Piping and Wilson's plovers*" [sic]. The Southeast United States Regional Waterbird Conservation Plan stated that herring gulls and great black-backed gulls "*...have increased dramatically in the Southeast U.S. and are considered to be important predators on other coastal nesting waterbirds...*" (Hunter et al 2006).

Hunter et al. (2006) recommended reducing the number of nesting herring gulls from 1,000 breeding pairs in the State to 750 pairs to alleviate predation and competition for nest sites between herring gulls and other higher priority waterbirds. Predation and nest site competition are naturally occurring events but

become a management issue when those factors occur on species experiencing severe population declines or during the restoration of waterbird breeding sites (Hunter et al. 2006).

Similar to ring-billed gulls, the EA addressed the need to manage damage and threats caused by herring gulls (USDA 2010). To reduce threats and damages associated with herring gulls using an integrated approach during implementation of the proposed action, the EA evaluated the lethal removal of up to 100 herring gulls by WS annually in addition to the dispersal of gulls using non-lethal methods. As discussed previously, the EA evaluated activities under the proposed action alternative based on previous requests for assistance and in anticipation of additional requests for assistance. During the development of the EA, most requests for assistance received by WS were associated with aircraft strike risks associated with herring gulls at airports. Since issuing the decision for the EA, other entities have requested WS' assistance with managing predation risks and nest site competition associated with nesting gulls in the State. WS could continue to receive requests for assistance to reduce threats associated with herring gulls to ground nesting bird species on barrier islands in the State.

As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods as described in the EA, the annual take of gulls to alleviate damage is also likely to increase during the implementation of the proposed action. In total, WS lethally removed 316 herring gulls in North Carolina to alleviate damage or threats of damage from FY 2010 through FY 2012 (see Table 10). During this period, WS also dispersed 2,678 herring gulls using non-lethal methods as part of an integrated approach to resolving gull predation damage in North Carolina. Based on the number of herring gulls WS addressed previously, WS could remove up to 350 herring gulls annually to alleviate damage and threats of damage, including addressing predation and nest site competition on barrier islands.

Table 10 – Number of herring gulls addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	1,002	3	4
2011	1,238	4	78
2012	438	309	103
TOTAL	**2,678**	**316**	**185**

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

To assist other entities with managing herring gull predation on other ground nesting birds, WS destroyed 468 herring gull nests and 946 eggs during June and July of 2012. During June and July of 2013, WS destroyed 577 herring gull nests and 1,219 eggs based on preliminary data. Herring gulls are a long-lived species that have the ability to identify areas with regular human disturbance and low reproductive success, which could cause those gulls to relocate and nest elsewhere when confronted with repeated nest failure. Based on those activities, WS could destroy up to 700 herring gull nests and 1,400 eggs annually to disperse herring gulls.

Using the number of nests observed during the 2011 waterbird survey (n=682 nests), a statewide breeding population could be estimated at 1,365 adults. If WS removed 350 herring gulls to alleviate damage and threats of damage, WS would reduce the breeding population to 1,015 adults in the State. As stated previously, the management objective established by the North Carolina Waterbird Committee was a statewide breeding population of ≤2,000 adults; therefore, reducing the number of adults to 1,015 herring gulls would be within the population management objective established by the Committee. The Southeast United States Regional Waterbird Conservation Plan established a breeding population objective of 1,500 adults. If WS reduced the breeding population to 1,015 herring gulls by the removal of 350 adults, the

statewide population would be 485 gulls below the population objective established by the Conservation Plan. In addition, the breeding population estimate does not include non-breeding gulls that may also be present in the State. Non-breeding gulls would also likely cause damage or pose threats of damage. The permitting of the lethal removal by the USFWS through the issuance of a permit pursuant to the MBTA would ensure the proposed removal of up to 350 herring gulls by WS would not adversely affect populations in the State. In addition, other entities could conduct the removal activities in the absence of WS' involvement. Therefore, WS' involvement would not change the environmental status quo if other entities removed gulls and/or nests with eggs in the absence of WS' involvement.

Additionally, impacts due to nest removal and destruction should have little adverse effect on the herring gull population. Most entities consider nest destruction methods as non-lethal. Although there may be reduced fecundity for the individuals affected by nest destruction, this activity would not have long-term effects on breeding adult gulls. The destruction of up to 700 herring gull nests annually by WS would occur in localized areas where nesting takes place and would not reach a level where adverse effects on herring gull populations would occur. As with the lethal removal of gulls, the USFWS must authorize the take of nests, including eggs. Therefore, the number of nests and eggs destroyed by WS annually would occur at the discretion of the USFWS.

GREAT BLACK-BACKED GULL BIOLOGY AND POPULATION IMPACT ANALYSIS

The great black-backed gull is the largest gull in the world and is primarily a coastal species. A bird of the North Atlantic, the great black-backed gull has been expanding its breeding and wintering ranges further south along the East Coast and into the Great Lakes. Along the coast, LeGrand et al. (2013) considers the great black-backed gull a permanent resident, with movements occurring during the migration period, while further inland, the black-backed gull is a rare winter visitor. During the breeding season, LeGrand et al. (2013) describes the abundance of black-backed gulls along the coastal plain region north of Cape Hatteras as "*fairly common*" and a "*slowly increasing coastal breeder…northward*". Black-backed gulls are "*uncommon to fairly common*" during the breeding season along the central coastal areas and are "*rare to uncommon*" along the southern coastal region during the breeding season (LeGrand et al. 2013).

The number of great black-backed gulls observed in areas of the State surveyed during the BBS has shown a declining trend estimated at -0.5% annually since 1966, with a -0.1% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). Across the southeastern coastal plain region, the number of great black-backed gulls observed in areas surveyed during the BBS have also shown declining trends estimated at -0.5% annually since 1966 and -0.1% annually between 2001 and 2011 (Sauer et al. 2012). However, across all routes surveyed in the United States, the number of gulls observed annually has increased with the annual increase estimated at 0.6% since 1966 and 12.3% annually between 2001 and 2011 (Sauer et al. 2012). Hunter et al. (2006) estimated the breeding population of great black-backed gulls in North Carolina to be 100 breeding pairs, which equates to a breeding population of 200 adults. Similar to herring gulls, various entities have conducted a periodic coast-wide survey of colonial-nesting waterbirds in North Carolina since 1977. During the 2011 survey, observers counted 254 great black-backed gull nests in areas surveyed.

During other seasons, LeGrand et al. (2013) indicates a similar pattern with gulls "*very common to abundant*" along the northern portion of the coastal plain and "*uncommon to fairly common*" along the southern coastal plain. The number of great black-backed gulls present in the State begins to increase in September and October as northern gulls arrive and decreases in April as gulls depart for breeding areas further north (LeGrand et al. 2013). Trend information from the CBC indicates the number of great black-backed gulls observed in areas of the State surveyed since 1966 has shown a general declining trend (National Audubon Society 2010).

The EA addressed the need to manage damage and threats caused by great black-backed gulls, primarily at airports where gulls pose an aircraft strike hazard (USDA 2010). To reduce threats and damages associated with great black-backed gulls using an integrated approach during implementation of the proposed action, the EA evaluated the lethal removal of up to 20 gulls and up to 10 nests by WS annually in addition to the dispersal of gulls using non-lethal methods. Between FY 2010 and FY 2012, WS dispersed 395 black-backed gulls in the State to alleviate damage (see Table 11). In addition, WS employed lethal methods to remove one black-backed gull during FY 2010 and 16 gulls during FY 2012.

As discussed previously, the EA evaluated activities under the proposed action alternative based on previous requests for assistance and in anticipation of additional requests for assistance. During the development of the EA, most requests for assistance received by WS were associated with aircraft strikes risks associated with gulls at airports. Entities have requested WS' assistance with managing predation risks and nest site competition associated with nesting gulls in the State.

Table 11 – Number of greater black-backed gulls addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	119	1	1
2011	150	0	0
2012	126	16	0
TOTAL	**395**	**17**	**1**

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

To assist other entities with managing gull predation on other ground nesting birds, WS destroyed 44 black-backed gull nests and 96 eggs during June and July of 2012. During June and July of 2013, WS destroyed 109 black-backed gull nests and 255 eggs based on preliminary data. Gulls are a long-lived species that have the ability to identify areas with regular disturbance and low reproductive success, which can cause gulls to relocate and nest elsewhere when confronted with repeated nest failure. WS could continue to receive requests for assistance to reduce threats associated with gulls to ground nesting bird species on barrier islands in the State. As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods, the number of gulls WS addresses annually to alleviate damage is also likely to increase during the implementation of the proposed action. WS anticipates addressing more gulls based on those requests to assist with managing nest predation and nest site competition and other requests for assistance, such as at airports. Based on previous activities requested of WS, WS could destroy up to 250 great black-backed gull nests and 400 eggs annually to disperse gulls. In addition, WS could lethally remove up to 250 great black-backed gulls annually to address damage and threats of damage.

To alleviate competition for nest sites and to reduce predation, Hunter et al. (2006) recommended reducing the number of nesting great black-backed gulls in North Carolina to 75 pairs. The North Carolina Waterbird Committee established a population management goal of ≤200 great black-backed gull breeding pairs, which equates to a breeding population of ≤400 gulls. The breeding population estimates would not include non-breeding gulls that would also be present in the State. Using the number of nests observed during the 2011 waterbird survey (n=254 nests), a statewide breeding population could be estimated at 508 adults, which exceeds the management objective of the Waterbird Committee and the Conservation Plan.

If WS removed 250 great black-backed gulls to alleviate damage and the threat of damage, the removal would reduce the breeding population to 129 breeding pairs or 258 adults in the State. As stated

previously, the management objective established by the North Carolina Waterbird Committee was a statewide breeding population of ≤200 adults; therefore, reducing the number of adults to 258 great black-backed gulls would be within the population management objective established by the Committee. The Southeast United States Regional Waterbird Conservation Plan established a breeding population objective of 150 adults (Hunter et al. 2006). If the removal of 250 adult black-backed gulls reduced the breeding population to 258 adult gulls, the statewide population would continue to be above the population objective established by the Waterbird Committee and the Conservation Plan. In addition, the breeding population estimate does not include non-breeding gulls that may also be present in the State. Non-breeding gulls would also likely be predators of other ground-nesting waterbirds.

The permitting of the take by the USFWS through the issuance of a permit pursuant to the MBTA would ensure the proposed removal of up to 250 great black-backed gulls by WS would not adversely affect populations in the State. Additionally, impacts due to nest removal and destruction should have little adverse effect on the great black-backed gull population. Most entities consider nest destruction methods as a non-lethal method. Although there may be reduced fecundity for the individuals affected by nest destruction, this activity would not have long-term effects on breeding adult gulls based on the limited activities proposed. The destruction of up to 250 great black-backed gull nests annually by WS would occur in localized areas where nesting takes place and would not reach a level where adverse effects on gull populations would occur. WS would only conduct activities when requested by other entities. Other entities could conduct the removal activities or destroy nests/eggs in the absence of WS' involvement. Therefore, WS' involvement would not change the environmental status quo since other entities would likely remove those gulls or destroy nests/eggs whether WS participated or not.

LEAST TERN BIOLOGY AND POPULATION IMPACT ANALYSIS

Least terns nest along the coastal beach areas and major interior rivers of North America; however, least terns are most abundant along the coastlines of the Atlantic Ocean and the Gulf of Mexico (Thompson et al. 1997). Least terns nest in a simple scrape in the sand, gravel, shells, or other fragmentary material (Thompson et al. 1997). Traditionally, nests of least terns in North Carolina occurred on the sandy beaches of barrier islands and stretches of the mainland shore (NCWRC 2005); however, least terns also nest on gravel rooftops of buildings (Schweitzer 2011). Based on the recommendations of the NCWRC, various entities are using dredged materials to stabilize existing islands and create new islands that terns and other colonial nesting waterbirds can use as alternative nesting sites (NCWRC 2005, Schweitzer 2011). The breeding season generally occurs from April through August but can extend into September (Thompson et al. 1997). After the breeding season, least terns migrate and winter along the marine coastlines of Central and South America (Thompson et al. 1997). The diet of the least tern consists primarily of fish but can include shrimp, marine worms, small crustaceans, and insects (Thompson et al. 1997).

Prior to the prohibition on take under the MBTA, people harvested least terns for the millinery trade, which likely substantially reduced the population of terns (Thompson et al. 1997). Beginning in the 1950s, populations of terns declined further from recreational, industrial, and residential development along coastal breeding areas and from the altered hydrology of rivers systems in the interior portion of their breeding range (Thompson et al. 1997). Due to those population declines, the population of terns in California was designated as endangered under the Endangered Species Act in 1970 (USFWS 1985) and the interior population of terns was designated as endangered in 1985 (USFWS 1990). However, the USFWS does not consider the population of least terns along the coastlines of the Atlantic Ocean and the Gulf of Mexico as endangered. The USFWS has not listed those populations under the Endangered Species Act. However, the NCWRC classifies the least tern as a species of "*special concern*" within the State.

Of the five tiers of action levels for waterbirds defined in the Southeast United States Waterbird Conservation Plan, Hunter et al. (2006) assigned least terns to the "*management attention*" tier, which is the lowest of the top three action levels that highlight the differing management needs of waterbirds (Hunter et al. 2006). The North American Waterbird Conservation Plan classified the least tern in a category of conservation concern considered as "*high*" (Kushlan et al. 2002).

Across the southeastern United States, the coastal population of least terns has been estimated at 16,400 breeding pairs, with 10,150 pairs occurring in the southeastern coastal plain region, 4,000 pairs occurring in Peninsular Florida, and 2,250 breeding pairs occurring elsewhere in the southeast (Hunter et al. 2006). The population objective for the southeastern United States is to maintain 10,000 to 50,000 breeding pairs of least terns (Hunter et al. 2006).

In North Carolina, LeGrand et al. (2013) classifies least terns as a summer resident that nests along the coast and very rare to rare visitor further inland. Least terns are present along the coast from early April to mid-September, with few terns present by October (LeGrand et al. 2013). The number of least terns observed in areas surveyed within the State during the BBS has shown annual declines since 1966 estimated at -2.7%, with -1.9% annual declines occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region, the number of terns observed across all routes of the BBS has declined -3.7% annually since 1966, with a -2.7% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). Across all routes surveyed in the eastern BBS region, the number of least terns observed has decline -4.2 annually since 1966, with a -2.7% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). During surveys conducted in 2011 along the coast of North Carolina, observers counted 2,916 least tern nests, which was 50% higher than the average number of nests counted annually during the previous 11 years of the survey (Schweitzer 2011). In addition, observers found least tern nests at 47 sites, including five rooftop sites, during the 2011 survey, which exceeded the nesting goal of 25 sites outlined in management plans (Schweitzer 2011).

The EA did not specifically address a need to address threats of damage associated with least terns in the State. However, like other waterbird species, least terns are often found roosting, nesting, and foraging in groups, which can increase strike risks when those groups occur at or near airports. WS has received requests for assistance associated with least terns at airports where terns were posing an aircraft strike risk. To alleviate threats of aircraft strikes, WS lethally removed two least terns in the State during FY 2012.

Based on those requests for assistance WS has received previously, WS anticipates receiving additional requests for assistance in the future associated with least terns. WS anticipates using primarily non-lethal harassment methods to address terns at or near airports to reduce the risk of aircraft strikes. Although WS could disperse least terns from areas around airports, no adverse effects would likely occur since those birds would be unharmed. WS would not employ non-lethal methods over large geographical areas or apply those methods at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over such a wide geographical scope that long-term adverse effects would occur to the species' population. Entities could request WS to lethal remove least terns on a limited basis when those terns represent immediate threats to aircraft. Based on previous activities, WS anticipates that requests for assistance could require the lethal removal of up to two least terns annually.

The removal of up to two terns would represent 0.01% of the 32,800 least terns estimated to nest across the southeastern United States. If two adult terns were associated with every nest counted during the 2011 colonial waterbird survey conducted in the State, the breeding population could be 5,832 terns based on the 2,916 nests counted. The removal of up to two terns by WS would represent 0.03% of the number of terns present in the State during 2011 survey based on the number of nests counted. On average, observers have counted 1,939 least tern nests in the State annually during the colonial waterbird survey

conducted over the last 11 years (Schweitzer 2011). If two adult terns were associated with each nest, the removal of two terns by WS would represent 0.05% of average number of terns breeding in the State. The numbers of non-breeding terns present in the State during the breeding season and the number of terns present during the migration periods is unknown. Lethal removal would only occur by WS when permitted by the USFWS and only at levels allowed under depredation permits. In addition, lethal removal would only occur when authorized by the NCWRC pursuant to Article 25 of the General Statutes of North Carolina. Based on previous requests for assistance, WS does not anticipate taking more than two least terns annually. The permitting of the take by the USFWS and the NCWRC ensures lethal removal would occur within population management objectives and any removal activities WS conducts occurs pursuant to federal and state laws and regulations.

MOURNING DOVE BIOLOGY AND POPULATION IMPACT ANALYSIS

Mourning doves are a drab grayish brown with a slender, white edged, pointed tail. They are one of the most abundant and widespread birds in North America (Otis et al. 2008). They occur throughout the year across most of the continental United States, including North Carolina (Otis et al. 2008). Doves occur in all 48 contiguous states of the United States and the southern portions of Canada with the northern populations being more migratory than the southern populations. LeGrand et al. (2013) considers mourning doves to be permanent residents of the State, with some migratory movements, and are common to abundant throughout the State. Mourning doves are habitat generalists that have likely benefitted from human changes (Otis et al. 2008). They prefer open habitats and occur in rural, suburban, and urban environments (Otis et al. 2008). The diet of mourning doves consists of seeds from cultivated (*e.g.*, sunflower, wheat, millet) or wild plants (*e.g.*, grasses, ragweed, pine) (Otis et al. 2008). Mourning doves are social birds during the non-breeding season and often form large flocks (Otis et al. 2008).

According to BBS trend data provided by Sauer et al. (2012), the number of mourning doves observed along routes in North Carolina has shown an increasing trend estimated at 0.4% annually from 1966 through 2011, with a 0.7% annual increase occurring from 2001 through 2011. BBS data currently indicates a decreasing trend in the southeastern coastal plain region estimated at -0.2% annually since 1966; however, from 2001 through 2011, the number of doves observed in areas surveyed have increased annually estimated at 0.3% (Sauer et al. 2012). North Carolina had the highest annual count of doves in the eastern United States based on the two-year mean of doves heard along routes surveyed in 2012 and 2013 (Seamans et al. 2013). From 2004 through 2013, the number of doves heard per route during mourning dove surveys conducted in North Carolina has shown an increase in the State of 0.2% annually. Similarly, the number of doves seen along routes surveyed has also shown an increasing trend estimated at 0.3% annually (Seamans et al. 2013). Overall, the number of doves heard and seen during mourning dove abundance surveys has increased annually between 2004 and 2013 estimated at 0.9% per year (Seamans et al. 2013). The Partners in Flight Science Committee (2013) estimated the breeding mourning dove population in North Carolina to be 2.1 million doves. The number of mourning doves observed in the State during the CBC has shown a general stable to slightly increasing trend since 1966 (National Audubon Society 2010).

Many states, including North Carolina, have regulated annual hunting seasons for doves. In North Carolina, hunters can harvest doves during a hunting season each year with generous harvest limits. Across the United States, Raftovich et al. (2013) estimated the preliminary mourning dove harvest in 2012 at 14.5 million doves. In North Carolina, the total harvest for the 2012 season was 1,020,600 doves (Raftovich et al. 2013).

Requests for WS' assistance associated with mourning doves occur primarily at airports in the State. Based on requests for assistance received prior to the development of the EA, the EA anticipated that WS could lethally remove up to 500 mourning doves annually as part of an integrated approach, including the

use of non-lethal methods, to alleviate threats of damage. However, as shown in Table 12, the number of mourning doves removed by WS annually has exceeded the level evaluated in the EA. As described in the EA, WS employed an integrated approach to alleviate damage associated with mourning doves from FY 2010 through FY 2012. WS dispersed 16,454 doves between FY 2010 and FY 2012 in the State to alleviate damage or threats of damage. In total, all entities in the State lethally removed 2,959 doves from 2010 through 2012 pursuant to depredation permits issued in the State by the USFWS. Between 2010 and 2012, hunters harvested over 2.4 million mourning doves in the State during the hunting season.

WS could continue to receive requests for assistance to reduce threats associated with doves at airfields in the State. Threats associated with mourning doves at airports occur primarily during the spring and fall migration periods when doves congregate into large flocks. The flocking behavior associated with mourning doves increases the likelihood of an aircraft striking and ingesting multiple doves into aircraft engines, which can cause catastrophic failure of aircraft systems. Since 1990, mourning doves have been involved in 113 aircraft strikes in the State (FAA 2013). As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods, the number of doves WS addresses annually to alleviate damage is also likely to increase during the implementation of the proposed action. WS anticipates addressing more doves based on those requests received from FY 2010 through FY 2012 to assist with managing strike risks at airfields. Based on previous activities requested of WS, WS could lethally remove up to 2,500 mourning doves annually.

Table 12 – Number of mourning doves addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits		Hunter Harvest
		WS' Take[1]	Take by All Entities[2]	
2010	11,269	696	759	686,900
2011	2,954	906	652	719,800
2012	2,231	758	1,548	1,020,600
TOTAL	**16,454**	**2,360**	**2,959**	**2,427,300**

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

If WS lethally removed 2,500 mourning doves, the removal would represent 0.1% of the statewide breeding population estimated at 2.1 million doves. If WS had removed 2,500 doves each year from 2010 through 2012, the removal would have represented 0.3% of the number of doves harvested in the State during the 2012 hunting season and 0.4% of the number of doves harvested in the State during the 2010 season. Cumulatively, the proposed lethal removal of 2,500 doves by WS and the highest annual lethal removal that occurred by all entities in 2012 would represent 0.2% of a statewide breeding population estimated at 2.1 million doves. Cumulatively, the combined removal would represent 0.6% of the number of doves harvested in the State during the 2010 hunting season and 0.4% of the doves harvested during the 2012 season.

Lethal removal of doves by WS would occur pursuant to permits issued by the USFWS to WS or under permits issued to cooperators where WS would act as an agent on the permit. Based on the limited lethal removal that could occur by WS when compared to the statewide breeding population and the annual harvest of doves in the State, WS' activities would not adversely affect the ability to harvest mourning doves in North Carolina during the open hunting season.

EASTERN BLUEBIRD BIOLOGY AND POPULATION IMPACT ANALYSIS

Eastern bluebirds range throughout the eastern United States and southern Canada, east of the Rocky Mountains (Gowaty and Plissner 1998). Bluebirds are cavity nesters using natural cavities, cavities

excavated by other species, or artificial cavities, such a bird boxes. Nesting locations are normally associated with cavities in open habitats where bluebirds forage on insects during the breeding season. In North Carolina, bluebirds occur statewide throughout the year (Gowaty and Plissner 1998) and permanent residents of the State, with some migratory movements (LeGrand et al. 2013). Since 1966, the number of Eastern bluebirds observed during the BBS conducted along roadways in North Carolina has increased an average of 3.8% annually, with a 2.2% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region, the number of bluebirds observed along routes surveyed during the BBS has shown annual increases estimated at 3.8% since 1966, with 2.0% annual increases occurring from 2001 through 2011 (Sauer et al. 2012). The Partners in Flight Science Committee (2013) estimates the statewide breeding population of bluebirds at 1.2 million birds. The number of bluebirds observed in the State during the CBC conducted since 1966 has shown a general increasing trend (National Audubon Society 2010).

During the CBC conducted during 2011, observers counted 6,221 Eastern bluebirds in areas surveyed and bluebirds were present on 45 counts in the State (National Audubon Society 2010). Between 2002 and 2011, CBC observers have noted an average of 5,520 bluebirds per year in areas of the State surveyed. The lowest number of bluebirds counted between 2002 and 2011 occurred in 2003 when observers conducting the CBC observed 4,245 bluebirds. The highest count occurred in 2010 when observers counted 6,861 bluebirds (National Audubon Society 2010).

The EA did not specifically address the need to manage damage or threats of damage associated with bluebirds. Since the completion of the EA, WS has received requests for assistance associated with bluebirds at air facilities in the State where bluebirds were attempting to nest inside cavities of aircraft. To alleviate damage and threats of damage associated with bluebirds, WS lethally removed 14 bluebirds during FY 2012. In addition, other entities lethally removed four bluebirds to alleviate damage pursuant to depredation permits issued during 2011. WS anticipates continuing to receive requests for assistance associated with bluebirds at air facilities in the State. Based on previous requests for assistance and in anticipation of receiving additional requests for assistance, WS could lethally remove up to 50 bluebirds annually in the State to alleviate damage or threats of damage.

If WS removed up to 50 bluebirds to alleviate damage and threats, the lethal removal would represent 0.004% of the estimated statewide breeding population. The lethal removal of up to 50 bluebirds would represent 0.8% of the 6,221 bluebirds observed in the State in areas surveyed during the 2011 CBC. The lethal removal of 50 bluebirds would represent 0.9% of the average number of bluebirds observed in areas surveyed during the CBC conducted in the State from 2002 through 2011. The lowest number of bluebirds observed in areas surveyed in the State during the CBC occurred in 2003 when observers counted 4,245 bluebirds. The lethal remove of 50 bluebirds would represent 1.2% of the number of bluebirds observed in areas surveyed during the 2003 CBC. As stated previously, other entities have also lethally removed bluebirds in the State to alleviate damage. Other entities lethally removed four bluebirds during 2011. If the number of bluebirds lethally removed were representative of the number of bluebirds that other entities could lethally remove in the future, the cumulative take of WS and other entities would represent 1.3% of the lowest number of bluebirds observed during the CBC conducted from 2002 through 2011. The cumulative removal would represent 1.0% of the average number of bluebirds observed in areas surveyed during the CBC conducted from 2002 through 2011.

Data from the CBC provides an indication of long-term trends associated with the number of birds observed wintering in the State. The intent of the data gathered during the CBC is not to represent population estimates of wintering bird populations. However, this supplement to the EA analyzes and compares information from the CBC to evaluate the magnitude of WS' proposed take that could occur. CBC data would be a minimum estimate given the survey parameters of the CBC and the survey only

covering a small portion of the State. The permitting of the take by the USFWS would also ensure lethal removal would not adversely affect bluebird populations.

NORTHERN MOCKINGBIRD BIOLOGY AND POPULATION IMPACT ANALYSIS

Since the early 1900s, the Northern mockingbird has been expanding its range northward along the east and west coasts of the United States and into southern Canada. The increased development of farmland and suburban areas, along with the planting of fruit-bearing ornamental shrubs and trees has probably aided their movement northward (Farnsworth et al. 2011). Northern mockingbirds aggressively defend their nest. Mockingbirds can attack and mob potential predators (and people) that approach too close. In North Carolina, Northern mockingbirds occur statewide throughout the year (Farnsworth et al. 2011) and are permanent residents of the State (LeGrand et al. 2013).

Since 1966, the number of Northern mockingbirds observed during the BBS conducted along roadways in North Carolina has increased an average of 0.6% annually, with a 1.1% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region, the number of mockingbirds observed along routes surveyed during the BBS has shown annual declines estimated at -0.4% since 1966, with a -0.1% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). The Partners in Flight Science Committee (2013) estimates the statewide breeding population of Northern mockingbirds at 840,000 birds.

The number of Northern mockingbirds observed in the State during the CBC conducted since 1966 has shown a general decreasing to stable trend (National Audubon Society 2010). During the CBC conducted during 2011, observers counted 2,534 Northern mockingbirds in areas surveyed and mockingbirds were present on 48 counts in the State (National Audubon Society 2010). Between 2002 and 2011, CBC observers have noted an average of 2,425 mockingbirds per year in areas of the State surveyed. The lowest number of mockingbirds counted between 2002 and 2011 occurred in 2005 when observers conducting the CBC observed 1,765 mockingbirds. The highest count occurred in 2004 when observers counted 2,969 mockingbirds (National Audubon Society 2010).

Requests for WS' assistance associated with mockingbirds occur primarily at airports in the State. Based on requests for assistance received prior to the development of the EA, the EA anticipated that WS could lethally remove up to 20 mockingbirds annually as part of an integrated approach, including the use of non-lethal methods, to alleviate threats of damage. However, the number of mockingbirds addressed annually by WS has increased as shown in Table 13. As described in the EA, WS employed an integrated approach to alleviate damage associated with mockingbirds from FY 2010 through FY 2012. WS dispersed 29 mockingbirds between FY 2010 and FY 2012 in the State to alleviate damage or threats of damage. In total, all entities in the State lethally removed 25 mockingbirds from 2010 through 2012 pursuant to depredation permits issued to entities in the State by the USFWS.

Table 13 – Number of northern mockingbirds addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	0	0	0
2011	10	5	5
2012	19	52	20
TOTAL	**29**	**57**	**25**

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

WS could continue to receive requests for assistance to reduce threats associated with mockingbirds at airfields in the State. As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods, the number of mockingbirds WS addresses annually to alleviate damage is also likely to increase during the implementation of the proposed action. WS anticipates addressing more mockingbirds based on those requests received from FY 2010 through FY 2012 to assist with managing strike risks at airfields. Based on previous activities requested of WS, WS could lethally remove up to 100 mockingbirds annually.

If WS removed up to 100 mockingbirds to alleviate damage and threats, the lethal removal would represent less than 0.01% of the estimated statewide breeding population of mockingbirds. The lethal removal of up to 100 mockingbirds would represent 4.0% of the 2,534 mockingbirds observed in the State in areas surveyed during the 2011 CBC. The lethal removal of 100 mockingbirds would represent 4.1% of the average number of mockingbirds observed in areas surveyed during the CBC conducted in the State from 2002 through 2011. The lowest number of mockingbirds observed in areas surveyed in the State during the CBC occurred in 2005 when observers counted 1,765 mockingbirds. The lethal remove of 100 mockingbirds would represent 5.7% of the number of mockingbirds observed in areas surveyed during the 2005 CBC. The permitting of the take by the USFWS would also ensure lethal removal would not adversely affect mockingbird populations.

COMMON GRACKLE BIOLOGY AND POPULATION IMPACT ANALYSIS

Common grackles are a semi-colonial nesting species often associated with human activities. Characterized by yellow eyes and iridescent bronze or purple plumage, common grackles are a common conspicuous bird species found in urban and residential environments (Peer and Bollinger 1997). The breeding range of the common grackle includes Canada and the United States east of the Rocky Mountains with grackles found throughout the year in the United States except for the far northern and western portion of the species range in the United States (Peer and Bollinger 1997). Common grackles have likely benefited from human activities, such as the clearing of forests in the eastern United States, which has provided suitable nesting habitat for grackles. The planting of trees in residential areas has also likely led to an expansion of the species range into the western United States (Peer and Bollinger 1997). The grackle has an extremely varied diet, which includes insects, crayfish, frogs, other small aquatic life, mice, nestling birds, eggs, sprouting and ripened grains, seeds, and fruits (Peer and Bollinger 1997). During the migration periods, common grackles often occur in mixed species flocks of blackbirds.

Common grackles occur statewide in North Carolina throughout the year; however, like many blackbirds, grackles can be rare to uncommon in the mountainous areas of the State during the winter (LeGrand et al. 2013). LeGrand et al. (2013) considers grackles to be permanent residents of the State with migratory movements occurring. Grackles nest in loose colonies that utilize pine trees in North Carolina found in woodlots or in rows in open areas (LeGrand et al. 2013). The breeding season occurs from March through July, with the peak occurring from mid-April through mid-June (Peer and Bollinger 1997). During the migration periods and the winter months, migrating grackles from northern nesting areas increase the number of grackles in the State (LeGrand et al 2013). During the migration periods, common grackles often form large flocks with other blackbird species with some roosts reaching 500,000 blackbirds (LeGrand et al. 2013).

The Partners in Flight Science Committee (2013) estimates the breeding population of grackles in the State at two million grackles. Since 1966, the number of grackles observed during the BBS has shown a downward trend in the State estimated at -1.9% annually, with a -2.3% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). Downward trends have also been estimated for the number of grackles observed during the BBS conducted along routes in the southeastern coastal plain region

estimated at -3.1% annually since 1966 as well as a downward trend across all routes surveyed in the eastern BBS region estimated at -1.9% annually since 1966 (Sauer et al. 2012).

The number of grackles observed in areas surveyed in the State during the CBC has shown a highly variable pattern, with a general overall downward trend (National Audubon Society 2010). During CBC surveys conducted from 2002 through 2011, observers have counted an average of 121,177 grackles in areas of the State surveyed. The lowest number of grackles observed during the CBC conducted from 2002 through 2011 occurred in 2011 when observers counted 23,111 grackles. The highest number of grackles recorded in the State during the CBC conducted between 2002 and 2011 occurred in 2004 when observers noted 395,566 grackles (National Audubon Society 2010), which demonstrates the variability in the number of grackles observed during the CBC from year to year.

Similar to many other bird species, requests for WS' assistance associated with grackles occur primarily at airports in the State. Based on requests for assistance received prior to the development of the EA, the EA anticipated that WS could lethally remove up to 20 grackles annually as part of an integrated approach, including the use of non-lethal methods, to alleviate threats of damage. WS addressed an average of an average of 478 grackles per year from FY 2010 through FY 2012, which represented a 144% increase in the number of grackles addressed annually when compared to the number WS addressed annually prior to the development of the EA. During FY 2010, WS lethally removed 12 grackles in the State to alleviate damage or threats of damage. In FY 2011 and FY 2012, WS employed lethal methods to remove 94 grackles and 23 grackles, respectively, to alleviate damage and threats of damage, which exceeded the level of annual removal evaluated in the EA. WS also employed non-lethal methods to disperse grackles from areas where damage or threats of damage were occurring. Between FY 2010 and FY 2012, WS dispersed 1,306 grackles using non-lethal methods.

WS anticipates requests for assistance associated with grackles to continue to increase, primarily at airports. As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods, the number of grackles WS addresses annually to alleviate damage is also likely to increase during the implementation of the proposed action. WS anticipates addressing more grackles based on those requests received from FY 2010 through FY 2012 to assist with managing strike risks at airfields. Based on previous activities requested of WS, WS could lethally remove up to 300 grackles annually.

If WS removed up to 300 grackles to alleviate damage and threats, the lethal removal would represent 0.02% of the estimated statewide breeding population of grackles. The lethal removal of up to 300 grackles would represent 1.3% of the 23,111 grackles observed in areas of the State surveyed during the 2011 CBC, which was the lowest number of grackles observed in areas surveyed during the CBC conducted from 2002 through 2011. The lethal removal of 300 grackles would represent 0.3% of the average number of grackles observed in areas surveyed during the CBC conducted in the State from 2002 through 2011.

Like other blackbird species, the take of common grackles can occur under the blackbird depredation order, which allows entities to remove blackbirds, including common grackles, when committing damage or about to commit damage without the need for a depredation permit from the USFWS. Until recently, reporting to the USFWS the number of blackbirds lethally removed annually was not required under the depredation order. However, the reporting of the number of blackbirds lethally removed annually to the USFWS is now required. Other than activities conducted by WS, the USFWS received no reports of lethal removal activities occurring by other entities from 2010 through 2012. WS expects the lethal removal of common grackles by other entities to be of low magnitude when compared to the statewide estimated population for North Carolina.

BROWN-HEADED COWBIRD BIOLOGY AND POPULATION IMPACT ANALYSIS

Brown-headed cowbirds are migratory birds found throughout the United States (Lowther 1993). During the non-breeding season, their range is restricted to the pacific coast as well as east and south of a line extending from west Texas through western Nebraska and Missouri along the southern part of the Great Lakes and through New England (Lowther 1993). Likely restricted to the range of bison (*Bison bison*) before the presence of European settlers, cowbirds were probably a common occurrence on the short-grass plains where they fed on insects disturbed by foraging bison (Lowther 1993). As people started clearing forests for agriculture, cowbirds expanded their breeding range (Lowther 1993). In North Carolina, brown-headed cowbirds can occur throughout the State (Lowther 1993, LeGrand et al 2013). Cowbirds still commonly occur in open grassland habitats but also inhabit urban and residential areas (Lowther 1993). Unique in their breeding habits, cowbirds are brood parasites, meaning they lay their eggs in the nests of other bird species (Lowther 1993). Female cowbirds can lay up to 40 eggs per season with female cowbirds laying eggs in the nests of over 220 species of birds (Lowther 1993). Cowbirds provide no parental care, with the raising of cowbird young occurring by the host species (Lowther 1993). The diet of brown-headed cowbirds includes insects and seeds (Lowther 1993). Brown-headed cowbirds are highly social and are a common component of mixed-species blackbird flocks, which may exceed 1 million birds (Lowther 1993, Peer and Bollinger 1997).

Similar to other blackbird species, peak numbers of brown-headed cowbirds likely occur during the migration periods. The Partners in Flight Science Committee (2013) estimates the statewide breeding population of cowbirds at one million cowbirds. According to BBS trend data provided by Sauer et al. (2012), the number of brown-headed cowbirds observed along routes in North Carolina has shown an increasing trend estimated at 0.9% annually from 1966 through 2011, with a 0.7% annual increase occurring from 2001 through 2011. In the southeastern coastal plain region, the number of cowbirds observed along routes surveyed during the BBS show a statistically significant annual increase estimated at 0.7% since 1966, with a -0.1% annual decline occurring from 2001 through 2011 (Sauer et al. 2012). The number of cowbirds observed during winter surveys conducted annually in the State has shown a cyclical pattern since 1966, with a general declining trend (National Audubon Society 2010).

Similar to many other bird species addressed in this supplement, requests for WS' assistance associated with cowbirds occur primarily at airports in the State. Based on requests for assistance received prior to the development of the EA, the EA anticipated that WS could lethally remove up to 20 cowbirds annually as part of an integrated approach. However, the number of cowbirds addressed annually by WS has increased as shown in Table 14. WS employed an integrated approach to alleviate damage associated with cowbirds from FY 2010 through FY 2012. WS dispersed 8,216 cowbirds between FY 2010 and FY 2012 in the State to alleviate damage or threats of damage. In total, WS lethally removed 352 cowbirds from FY 2010 through FY 2012.

Table 14 – Number of brown-headed cowbirds addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	5,210	108	13
2011	927	52	4
2012	2,079	192	311
TOTAL	**8,216**	**352**	**328**

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

WS could continue to receive requests for assistance to reduce threats associated with cowbirds, primarily at airfields in the State. As part of an integrated approach to managing damage and threats using both

lethal and non-lethal methods, the number of cowbirds WS addresses annually to alleviate damage is also likely to increase during the implementation of the proposed action. WS anticipates addressing more cowbirds based on those requests received from FY 2010 through FY 2012 to assist with managing damage, primarily strike risks at airfields. Based on previous activities requested of WS, WS could lethally remove up to 350 cowbirds annually.

If WS removed up to 350 cowbirds to alleviate damage and threats, the lethal removal would represent 0.04% of the estimated statewide breeding population of cowbirds. As shown in Table 14, all entities in the State reported lethally removing 328 cowbirds in the State from 2010 through 2012, with the highest annual removal occurring in 2012 when entities reported removing 311 cowbirds. If take by other entities reached 311 cowbirds and WS lethally removed 350 cowbirds, the cumulative removal would represent less than 0.1% of the estimated breeding population.

HOUSE FINCH BIOLOGY AND POPULATION IMPACT ANALYSIS

Native to the western United States, Mexico, and extreme southwest parts of Canada, the house finch population in the eastern United States is thought to have originated from a small number of birds released on Long Island, New York in 1940 (Badyaev et al. 2012). Today, house finches occur across the United States, southern Canada, and most of Mexico (Badyaev et al. 2012). The first reports of house finches occurred in the late 1960s and within 10 years, the range of the house finch extended across the State (LeGrand et al. 2013). Today, LeGrand et al. (2013) considers house finches to be permanent residents of the State with the highest concentrations occurring around cities and towns. Finches nest in shrubs and other low vegetation within the State during the breeding season and can occur in flocks during the fall and winter; however, it is unclear whether large flocks consist of local birds or whether some migration movements occur (LeGrand et al. 2013).

In North Carolina, the number of house finches observed along routes surveyed during the BBS has increased annually. Since 1966, the number of finches observed has increased an estimated 11.1% annually in the State, with a 0.7% annual increase occurring from 2001 through 2011 (Sauer et al. 2012). In the southeastern coastal plain region, the number of finches observed along routes surveyed during the BBS has shown annual increases estimated at 15.3% since 1966; however, from 2001 through 2011, the number of house finches observed has declined -0.5% annually (Sauer et al. 2012). Based on BBS data, the Partners in Flight Science Committee (2013) estimated the statewide breeding population at 700,000 finches.

Participants of the CBC did not observe house finches in areas of the State surveyed during the CBC until 1969 when observers recorded observing two finches on two separate counts (National Audubon Society 2010). In comparison, observers recorded observing 2,440 house finches in areas of the State surveyed during the CBC and finches were present on 42 different counts conducted during 2011 (National Audubon Society 2010).

Damages and threats of damage associated with house finches occur primarily at air facilities in the State. Based on the number of requests received by WS to manage damage and threats associated with house finches during the development of the EA, the EA evaluated the lethal take of up to 20 house finches as part of an integrated approach to resolving requests for assistance (USDA 2010). Since the completion of the EA, the number of requests for assistance received by WS to manage damage and threats at airports has increased. WS did not receive requests for assistance associated with house finches from FY 2004 through FY 2008. In FY 2009, WS addressed three house finches in the State and one finch during FY 2010. In FY 2012, WS addressed 214 house finches at airports to address damage and threats of damage (see Table 15).

Table 15 – Number of house finches addressed in North Carolina from 2010 to 2012

Year	Dispersed by WS[1]	Take under Depredation Permits	
		WS' Take[1]	Take by All Entities[2]
2010	0	1	0
2011	0	0	0
2012	145	69	0
TOTAL	**145**	**70**	**0**

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

As part of an integrated approach to managing damage and threats using both lethal and non-lethal methods as described in the EA, the annual take of house finches to alleviate damage is also likely to increase during the implementation of the proposed action. The highest level of house finch take by WS occurred in FY 2012 when WS removed 69 house finches. In addition, WS has employed non-lethal methods to harass 145 house finches at airports in the State during FY 2012. WS anticipates addressing more finches based on those requests received during FY 2012 to assist with managing damage, primarily strike risks at airfields. Based on previous activities requested of WS, WS could lethally remove up to 175 house finches annually.

Based on a breeding population estimated at 700,000 finches, the lethal removal of up to 175 finches by WS would represent 0.03% of the estimated statewide breeding population. Given the low magnitude of the proposed take on the estimated breeding population and the permitting of the take by the USFWS through the issuance of a depredation permit pursuant to the MBTA, the proposed take of up to 175 house finches by WS would not adversely affect populations in the State.

ADDITIONAL TARGET SPECIES

WS has addressed limited numbers of additional target species previously or WS anticipates addressing a limited number of additional species under the proposed action alternative. WS could address those species primarily to alleviate aircraft strike risks at airports. Strike risks associated with those species often occur infrequently or involve only a few individuals. Target bird species that could be addressed by WS in limited numbers, after receiving a request for assistance associated with those species, would include buffleheads, red-breasted mergansers, northern bobwhite, pied-billed grebes, American bitterns, Mississippi kites, sandhill cranes, snowy egrets, ruddy turnstones, sanderlings, Forster's terns, sandwich terns, merlin, Eastern kingbirds, and brown thrashers. WS has previously addressed individuals of those species using primarily non-lethal harassment methods to disperse those birds from areas where damage or threats of damage were occurring (see Table 4, Table 5, and Table 6). WS anticipates continuing to use primarily non-lethal methods to alleviate damage or threats of damage associated with those species; however, entities could request WS remove a limited number of individuals when those target bird species pose a direct threat to human safety from aircraft strikes or when non-lethal methods were ineffective at alleviating damage or reducing risks of damage.

Based on previous requests for assistance and the take levels necessary to alleviate those requests for assistance or in anticipation of the need to address those species, WS could lethally remove up to 20 individuals of each of those species annually in the State. In addition, to alleviate damage or discourage nesting in areas where damages were occurring, WS could destroy up to 10 nests of each of those species annually in the State, except for buffleheads, red-breasted mergansers, pied-billed grebes, American bitterns, sandhill cranes, snowy egrets, ruddy turnstones, sanderlings, Forster's terns, sandwich terns, and merlin. WS does not anticipate receiving requests for assistance associated with nests of those species since most of those species do not nest in the State. WS does not expect the lethal removal of those bird species to reach a magnitude that would adversely affect populations of those species. The MBTA

affords protection from take for those bird species and take could only legally occur through the issuance of a depredation permit and only at those levels stipulated in the permit. Therefore, WS would only remove those birds, including their nests, listed under the MBTA in accordance with applicable state and federal laws and regulations authorizing take of migratory birds and their nests and eggs, including the USFWS and the NCWRC permitting processes. The USFWS and the NCWRC, as the agencies with management responsibility for migratory birds, could impose restrictions on depredation take as needed to assure cumulative take does not adversely affect the continued viability of populations. This would assure that cumulative impacts on those bird populations would not significantly affect the quality of the human environment. In addition, WS would report any take of the above species in accordance with an issued federal and state permit to the USFWS and the NCWRC annually.

Under the proposed action alternative, WS could destroy up to 10 nests annually and the associated eggs of those species as part of an integrated approach to managing damage, except for buffleheads, red-breasted mergansers, pied-billed grebes, American bitterns, sandhill cranes, snowy egret, ruddy turnstones, sanderlings, Forster's terns, sandwich terns, and merlin. Some entities consider nest and egg destruction methods as non-lethal when conducted before the development of an embryo. Many bird species have the ability to identify areas with regular human disturbance and low reproductive success and they will relocate to nest elsewhere when confronted with repeated nest failure. Although there may be reduced fecundity for the individuals affected by nest destruction, this activity has no long-term effect on breeding adult birds. WS would not use nest and egg removal as a population management method. WS would use this method to inhibit nesting in an area experiencing damage due to the nesting activity and would only employ nest destruction at a localized level. As with the lethal removal of birds, the destruction of nests can only occur when authorized by the USFWS. Therefore, the number of nests taken by WS annually would occur at the discretion of the USFWS.

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

The issue of non-target species effects, including effects on T&E species, arises from the use of non-lethal and lethal methods 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 designed SOPs to reduce the effects of damage management activities on non-target species' populations, which the EA discussed in Chapter 3 (USDA 2010). To reduce the risks of adverse effects occurring to non-target wildlife, WS would select methods that were as target-selective as possible or would apply such methods in ways that would reduce the likelihood of dispersing, capturing, or killing non-target species. Before initiating management activities, WS would also select locations that target species were using extensively and employ baits or lures that target species prefer. Despite WS' best efforts to minimize non-target take during program activities, the potential to capture, disperse, or kill non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Effects on Non-targets from WS' Activities Conducted in the State from FY 2010 through FY 2012

As described in the EA, during the implementation of the selected alternative from FY 2010 through FY 2012, WS has employed an integrated methods approach using non-lethal and lethal methods to alleviate damage. Non-lethal methods have the potential to exclude, harass, and disperse non-target wildlife. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason for erecting the exclusion. Potential adverse effects could occur if exclusion of non-target species occurred over a large area. The use of auditory and visual dispersal methods to reduce damage or threats caused by target species would also likely disperse non-targets in the immediate area when employing those methods. However, expectations would be that dispersing non-target species would be temporary with target and non-target species often returning after the cessation of dispersal

methods. WS would handle any potential non-targets live-captured using non-lethal methods in such a manner as to ensure the survivability of the animal when released.

WS employed those SOPs discussed in Chapter 3 of the EA to safeguard against the lethal removal of non-targets during operational use of methods and techniques for resolving damage and reducing threats. As discussed in the EA, the unintentional removal of non-targets did not occur during activities conducted by WS from FY 2004 through FY 2009. During the implementation of the proposed action alternative from FY 2010 through FY 2012, no lethal removal of non-targets occurred by WS. Despite those precautions, the use of lethal methods could result in the lethal removal of unintended species. However, as addressed in the EA, those occurrences should be minimal and should not affect the overall populations of any wildlife species.

During the development of the EA, WS obtained and reviewed the list of species designated as threatened or endangered in North Carolina, as determined by the USFWS and the National Marine Fisheries Services. Appendix C and Appendix D of the EA contains the list of species designated as threatened or endangered in the State by the USFWS, the National Marine Fisheries Services, and the NCWRC at the time the EA was developed. Based on a review of those T&E species listed in the State during the development of the EA, WS determined that activities conducted pursuant to the proposed action would not likely adversely affect those species listed in the State or their critical habitats. As part of the development of the EA, WS consulted with the USFWS under Section 7 of the Endangered Species Act and with the NCWRC. The USFWS and the NCWRC concurred with WS' determination that activities conducted pursuant to the proposed action would not likely adversely affect those species currently listed in the State or their critical habitats (A. Ratzlaff, USFWS, pers. comm. 2010, C. McGrath, NCWRC, pers. comm. 2010).

WS did not receive reports of or observe adverse effects to T&E species from activities conducted from FY 2010 through FY 2012. Since the development of the EA, the USFWS, the National Marine Fisheries Service, and the NCWRC have not listed additional species as threatened or endangered in the State. Thus, WS' determination of no adverse effect would still be appropriate for the proposed action for those threatened or endangered species addressed in the EA. WS would continue to monitor the list of T&E species occurring in North Carolina.

Effects on Non-targets from WS' Activities under the Proposed Supplement to the EA

As discussed in the EA and previously in this supplement, the potential for effects on non-target wildlife populations would primarily be associated with the use of lethal methods to alleviate damage. Non-lethal methods would have minimal effects on overall populations of non-target wildlife since those individuals dispersed would be unharmed. WS would not employ non-lethal methods over large geographical areas and would not apply those methods at such intensity that essential resources (*e.g.*, food sources, habitat) would be unavailable for extended durations or over such a wide geographical scope that long-term adverse effects would occur to a species' population. Lethal methods available under the proposed action would include the use of firearms, DRC-1339, and live-capture followed by euthanasia. No additional lethal methods are available to address bird damage. The EA addressed those methods WS employed from FY 2010 through FY 2012.

Shooting would essentially be selective for the target species since identification of the target would occur prior to application. Therefore, any increase in the use of a firearm to resolve damage and threats associated with those activities described in the supplement to the EA would not result in adverse effects to non-targets since no lethal take of non-targets has occurred previously and WS does not expect lethal take of non-targets to occur from the use of firearms.

Euthanasia of target bird species could occur after WS uses live-capture methods (*e.g.*, live-traps, nets). Live-capture methods allow for the release of non-target wildlife if captured since those methods require WS' personnel to be present during the application of the methods or WS would monitor those methods frequently. An increase in the use of live-capture methods to address increasing requests for assistance and additional bird species would not adversely affect non-target bird species since WS could release non-targets on site if live-captured. Euthanasia methods discussed in the EA are selective for target species.

The chemical method DRC-1339 would be available to address damage associated with starlings, pigeons, blackbirds, and some gull species, if registered in the State. WS did not use DRC-1339 during activities conducted from FY 2010 through FY 2012. The EA addressed the potential threats to non-targets associated with the use of DRC-1339. The label of DRC-1339 incorporates several minimization measures to reduce risks to non-targets. As required by the label, WS would pre-bait all potential bait sites and monitor those sites for non-target use as outlined in the pre-treatment observations section of the label. If WS observed non-targets feeding on the pre-bait, WS would abandon those plots and no baiting would occur at those locations. WS would retrieve, to the extent possible, all uneaten treated baits to minimize non-target exposure. Following the label requirements of DRC-1339 would ensure risks to non-targets were minimal.

This supplement to the EA evaluates those activities conducted by WS pursuant to the proposed action in the EA to resolve an increasing number of requests to manage damage or threats of damage to resources and to meet the need for action associated with additional bird species that the EA did not address. WS' response to an increasing number of requests for direct operational assistance and additional bird species could result in the increased use of methods to resolve those requests. The number of methods employed to resolve the increasing requests for assistance and to address damage associated with additional bird species could also increase under the proposed supplement to the EA. In addition, the frequency of individual method application to resolve requests for assistance would also likely increase. However, the unintentional lethal removal of non-targets has not occurred by WS during previous damage management activities targeting birds. Therefore, WS does not anticipate activities associated with this supplement would result in a substantive increase in the unintentional lethal removal of non-targets. Since WS would continue to employ those methods addressed in the EA, WS' determination of no adverse effect would still be appropriate for the proposed action for those threatened or endangered species addressed in the EA.

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

Based on the analyses in the EA, when WS conducts activities according to WS' directives, SOPs, and in accordance with federal, state, and local laws, those activities pose minimal risks to human safety (USDA 2010). The analyses in the EA also concluded that WS' activities to reduce threats and hazards associated with birds were likely to provide some benefits to human health and safety by addressing safety issues and disease transmission associated with those birds and reducing bird strikes at airfields. Bird strikes with aircraft can lead to extensive damage to aircraft and can threaten passenger safety.

Human Safety Analysis from WS' Activities Conducted in the State from FY 2010 through FY 2012

Management activities conducted by WS from FY 2010 through FY 2012 did not result in any injuries or illness to any members of the public or to WS' personnel. WS received no reports of injuries or illnesses from WS' activities conducted from FY 2010 through FY 2012. WS' program activities benefited human safety in those situations that reduced the risks of potential injury, illness, and loss of human life from injurious bird species. The EA concluded that an integrated approach to wildlife damage management

had the greatest potential of successfully reducing potential risks to human health and safety in North Carolina.

Human Safety Analysis under the Proposed Supplement to the EA

The supplement to the EA evaluates the implementation of the proposed action to address an increasing number of requests for assistance to manage damage and threats associated with mourning doves, killdeer, ring-billed gulls, herring gulls, great black-backed gulls, common grackles, brown-headed cowbirds, house finches, Northern mockingbirds, and turkey vultures. In addition, WS has received requests to address buffleheads, red-breasted mergansers, Northern bobwhite, pied-billed grebes, brown pelicans, American bitterns, snowy egrets, Mississippi kites, sandhill cranes, upland sandpipers, ruddy turnstones, sanderlings, Bonaparte's gulls, least terns, Forster's terns, sandwich terns, merlin, eastern kingbirds, eastern bluebirds, and brown thrashers, which were not specifically addressed in the EA.

Addressing damage or threats of damage associated with those species could result in employing methods with more frequency to resolve damage. Those methods described in the EA inherently pose minimal risks to human safety when used appropriately and in consideration of human safety. WS would continue to incorporate those SOPs described in Chapter 3 of the EA into damage management activities, which would minimize risks to human safety. Based on the use patterns of the methods available, an incretion in the use of those methods to address those activities described in the supplement to the EA pertaining to an increase in activities would not increase risks to human safety. The training and experience of WS' employees in the proper use of methods would ensure the safety of employees and the public. No adverse effects to human safety have occurred from WS' activities conducted from FY 2010 through FY 2012. An increase in the number of methods used or an increase in the frequency that WS uses a method would not increase risks to human safety when consideration of human safety was part of the use pattern associated with those methods.

Issue 4 - Effects on the Aesthetic Values of Birds

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

Even the use of exclusionary devices could lead to the dispersal of birds if the resource damaged was acting as an attractant. Thus, once an entity removed the attractant or made the attractant unavailable, birds would likely disperse to other areas where resources were more vulnerable making those birds unavailable for viewing or enjoyment at the location where damage was occurring.

Effects on Aesthetics from WS' Activities Conducted in the State from FY 2010 through FY 2012

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 birds. The WS program in North Carolina only conducted activities at the request of the affected property owner or resource manager. Upon receiving a request for assistance, WS addressed issues/concerns and WS provided explanations for the reasons why a particular method or group of methods would be the most effective in reducing damage for the specific situation. WS and the entity seeking assistance agreed upon methods that WS could employ to reduce or resolve damage through the signing of an MOU, a cooperative service agreement, or other comparable document.

Information in this supplement to the EA indicates that WS' removal of bird species have been minimal and of a low magnitude based on quantitative and qualitative factors. WS' removal of birds has not reached a magnitude of take that would severely limit the ability to view and enjoy birds. WS only targeted those birds identified as causing damage during damage management activities and only after receiving a request for such action. WS addressed most birds using non-lethal harassment methods to alleviate damage and threats, which dispersed birds from those areas. Similarly, the use of lethal methods removed those birds associated with the damage. However, those persons interested could view birds outside the area where WS conducted damage management activities if entities made a reasonable effort to locate birds outside of the damage management area. WS receives requests to conduct damage management activities on only a small portion of the land area in North Carolina. Therefore, WS does not conduct activities over large areas that would greatly limit the aesthetic value of birds.

Effects on Aesthetics Analysis under the Proposed Supplement to the EA

The activities addressed in this supplement to the EA could result in a greater number of birds being lethally removed or could result in an increase in the number of locations where birds are lethally removed. The use of lethal methods could result in temporary declines in local populations resulting from the removal of target bird species to resolve requests for assistance. WS' goal would be to respond to requests for assistance and to manage those birds responsible for the resulting damage. Therefore, the ability to view and enjoy birds would remain if entities made a reasonable effort to locate birds outside the area in which damage management activities occurred.

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

As shown under Issue 1, the magnitude of WS' proposed removal of birds under the supplement to the EA would be low if removal occurred at the levels proposed. WS' proposed activities addressed in this supplement would not result in declines of bird populations over a large geographical area but would be limited to site specific locations where bird damage has occurred or was likely to occur. Therefore, even with the proposed increased removal of certain bird species under the supplement, those bird populations would remain high in the State and people could enjoy the aesthetic value of those species if people made a reasonable attempt to locate those species outside of the damage management area.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

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.

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. The goal of WS would be to use methods as humanely as possible to resolve requests for assistance to reduce damage and threats of damage. WS would continue to evaluate methods and

activities to minimize the potential pain and suffering of wildlife when attempting to resolve requests for assistance.

As mentioned in the EA, people often stereotype methods as "*humane*" or "*inhumane*". However, many "*humane*" methods can be inhumane if not used appropriately. For instance, many people would generally consider a cage trap as "*humane*" since the animal would be alive and generally unharmed. However, the inhumane treatment of an animal captured alive in a cage trap could occur if the person using the cage trap did not attend to the animal appropriately or without proper care. Therefore, WS' mission would be to address requests for assistance using methods in the most humane way possible that would minimize the stress and pain of the animal. WS' personnel would be experienced and professional in their use of management methods, and WS' employees would apply methods as humanely as possible.

Humaneness Analysis from WS' Activities Conducted in the State from FY 2010 through FY 2012

Methods used in bird damage management activities in North Carolina from FY 2010 through FY 2012 and their potential impacts on humaneness and animal welfare did not changed from those analyzed in the EA. The EA identified and discussed all of the methods employed by WS from FY 2010 through FY 2012 to alleviate bird damage (USDA 2010). WS continued to employ methods as humanely as possible to minimize distress. Live-captured birds addressed in the EA were euthanized using methods considered appropriate for wild birds by the American Veterinary Medical Association (2013). Therefore, method humaneness associated with those methods used by WS to manage damage and threats caused by birds from FY 2010 through FY 2012 has not changed from the analysis in the EA.

Humaneness Analysis under the Proposed Supplement to the EA

Since those methods described in Appendix B of the EA would continue to be available under the proposed supplement to the EA, the issue of humaneness would be similar despite the frequency of method use increasing. Some people would continue to consider certain methods as inhumane no matter the frequency of use. Those people that consider methods as inhumane would continue to consider those methods as inhumane under the supplement to the EA. Therefore, the analyses in the EA for the humaneness of methods would not change under the supplement to the EA. WS would continue to employ methods as humanely as possible and would continue to employ euthanasia methods recommended for wild birds by the American Veterinary Medical Association (2013).

Issue 6 - Effects of Bird Damage Management Activities on the Regulated Harvest of Birds

The populations of several migratory bird species addressed in the EA are sufficient to allow for annual harvest seasons that typically occur during the fall migration periods of those species. The USFWS establishes frameworks for migratory bird hunting seasons, which the NCWRC can implement in the State. Those species addressed in the EA that have established hunting seasons include: American crows, fish crows, wild turkeys, mallards, blue-winged teal, green-winged teal, American coots, American black ducks, common mergansers, hooded mergansers, canvasbacks, Northern pintails, Northern shovelers, ruddy ducks, greater scaup, lesser scaup, American wigeons, wood ducks, common snipe, mourning doves, ring-necked pheasants, and Atlantic brant.

Effects on the Ability to Harvest Birds from WS' Activities conducted from FY 2010 through FY 2012

Of those bird species considered harvestable during hunting seasons in the State, WS addressed wood ducks, mallards, blue-winged teal, green-winged teal, hooded mergansers, common mergansers, ruddy ducks, wild turkeys, American coots, mourning doves, American crows, and fish crows from FY 2010 though FY 2012. WS also addressed buffleheads, red-breasted mergansers, Northern bobwhite, and

sandhill cranes between FY 2010 and FY 2012, which the EA did not specifically address. Hunters can harvest those species during regulated seasons in the State, except sandhill cranes. There is currently no hunting season for sandhill cranes in North Carolina; however, the USFWS and some state agencies allow hunters to harvest cranes during regulated season in other parts of the United States.

The magnitude of WS' lethal removal activities for those bird species considered harvestable was low when compared to the mortality of those species from all known sources. When the number of birds lethally removed by WS was included as part of the known mortality of those species and compared to population information, the impact on those species' populations was below the level of removal required to lower population levels. WS primarily conducted damage management activities in areas where hunting access was restricted (*e.g.*, airports). The use of non-lethal or lethal methods often disperses birds from areas where damage was occurring to areas outside the damage area, which could serve to move birds from less accessible areas to places accessible to hunters.

Effects on the Ability to Harvest Birds under the Proposed Supplement to the EA

Of those species addressed in the EA that WS has received increasing requests for assistance or addressed an increasing number of birds, only mourning doves are harvestable in the State during annual hunting seasons. Of those species not specifically addressed in the EA that WS dispersed or lethally removed during activities conducted from FY 2010 through FY 2012, hunters can harvest bufflehead, red-breasted mergansers, and Northern bobwhite in the State during annual hunting seasons. The USFWS and the NCWRC have oversight of bird populations in the State; therefore, the number of birds the USFWS and the NCWRC allows WS to remove annually would not limit the ability of hunters to harvest those bird species during the regulated season. WS would report all take to the USFWS and the NCWRC annually to ensure those agencies incorporate removal by WS into population management objectives established for bird populations. Based on the limited take proposed by WS and the oversight by the USFWS and the NCWRC, WS' take of birds annually would have no effect on the ability of hunters to harvest birds during the regulated harvest season.

CUMULATIVE IMPACTS OF THE PROPOSED ACTION

Cumulative impacts, as defined by Council on Environmental Quality (see 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 would be the primary federal program with damage management responsibilities; however, other entities may conduct similar activities in North Carolina as permitted by the USFWS and the NCWRC. Through ongoing coordination with the USFWS and the NCWRC, WS would be 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 in the EA and discussed below either could occur because of WS' program activities over time or because 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 State 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. This supplement to the EA will not analyze those resources 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 because of any of the alternatives. Those alternatives would meet the requirements of applicable laws, regulations, and Executive Orders, including the Clean Air Act and Executive Order 13514.

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

Evaluation of WS' activities relative to target bird populations indicated that program activities would likely have no cumulative adverse effects on populations in North Carolina. WS' actions would be occurring simultaneously, over time, with other natural processes and human-generated changes that are currently taking place. Those activities could include (1) the natural mortality of birds, (2) mortality of birds from illegal take, (3) mortality from aircraft strikes, vehicle strikes, and other strikes, (4) human-induced mortality through private damage management activities, (5) human and naturally induced alterations of wildlife habitat, and (6) the annual and perennial cycles in population densities.

All of those factors can play a role in the dynamics of bird 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. However, WS would only provide assistance when requested by the appropriate property owner or manager and only in areas where the appropriate landowner/manager and WS sign a MOU, cooperative service agreement, or other comparable document. Therefore, for the purpose of minimizing or avoiding impacts to the environment, the scope, duration, and intensity of actions conducted by WS to minimize or eliminate bird damage would be constrained. 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 2010). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative effects on target species.

With management authority over most bird populations, the USFWS can adjust take levels, including the take by WS, to achieve population objectives for birds. Consultation and reporting of take by WS would ensure the USFWS considers any activities conducted by WS. WS expects no cumulative adverse effects on the populations of target bird species from WS' actions based on the following considerations:

Historical Outcomes of WS' Activities to Address Bird Damage in North Carolina

The EA, the monitoring reports for the EA, and this supplement evaluate the implementation of activities over time to assist with identifying cumulative effects. Historically, WS' activities to manage damage caused by birds in North Carolina have not reached a magnitude that would cause adverse effects to bird population in the State. WS would continue to implement an integrated damage management program that adapts to the damage situation. WS would only target those birds causing damage and only after WS received a request for assistance. All program activities would be coordinated with appropriate federal, state, and local entities to ensure WS' activities did not adversely affect the populations of any native bird species.

WS continued to implement an integrated program that employed 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

WS designs SOPs to reduce the potential negative effects of WS' actions on birds. WS tailors the SOPS to respond to changes in populations that could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. WS ensures implementation of SOPs through monitoring, in accordance with WS' Decision Model (Slate et al. 1992, USDA 2010).

Migratory Bird Treaty Act, as amended

The MBTA makes it unlawful to, "*to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase*" some migratory bird species, or their parts, nests, or eggs (see 16 USC 703-711). A list of bird species protected under the MBTA occurs in 50 CFR 10.13. The MBTA does allow for the lethal take of those bird species listed in 50 CFR 10.13 when depredation occurs through the issuance of depredation permits or the establishment of depredation/control orders. The law prohibits "*take*" of those migratory bird species listed in the Act, except as permitted. The MBTA does not protect free-ranging domestic and feral waterfowl, mute swans, wild turkeys, Northern bobwhite, and ring-necked pheasants (see 70 FR 12710-12716). The MBTA provides the USFWS with statutory authority for enforcing the MBTA. Under this authority, the USFWS may issue depredation/control orders or depredation permits to resolve damage caused by bird species protected under the Act. Information regarding permits occurs in 50 CFR 13 and 50 CFR 21. Additionally, the Act grants the USFWS the authority to establish hunting seasons for migratory game birds and crows (see 50 CFR 20). Therefore, the USFWS has jurisdiction over the management of migratory birds and has specialized expertise in identifying and quantifying potential effects to the human environment relating to the management of migratory birds.

The permitting of take by the USFWS pursuant to the MBTA would ensure take by WS and other entities occurred within allowable take levels to achieve desired population objectives for those birds. The USFWS would analyze the allowed take, including cumulative take, prior to the issuance of permits under the Act. Therefore, the USFWS and the NCWRC would continue to regulate and adjust the number of birds lethally taken annually during hunting seasons, under depredation/control orders, or through the issuance of depredation permits. The USFWS and the NCWRC considers all known take when determining population objectives for birds and could adjust the number of birds that could be taken during the regulated hunting season and the number of birds taken for damage management purposes to achieve population objectives. The USFWS and the NCWRC authorize take by WS and occurs at their discretion. Consultation and reporting of take by WS under the proposed action would ensure the USFWS and the NCWRC considers any activities conducted by WS. Any target bird population declines or increases induced through the regulation of take would be the collective objective for bird populations established by the USFWS and the NCWRC. Therefore, the cumulative take of birds annually or over time by WS would occur at the discretion of the USFWS and the NCWRC as part of their management objectives for birds in the State.

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

Potential effects on non-target species from conducting damage management activities arise from the use of non-lethal and lethal methods to alleviate damages or to alleviate threats of damage. The use of non-lethal methods during activities to reduce or prevent damage caused by target bird species 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. Using exclusion devices can prevent both target and non-target wildlife 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 could disperse those individuals to other areas.

Exclusionary methods often 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 their use would exclude non-targets from large areas that would cumulatively impact populations from the inability to access a resource, such as potential food sources. The use of visual and auditory harassment and dispersion methods are generally temporary with non-target species often 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, their use would not occur 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 affect 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 a target individual triggers the method. WS would employ capture methods in such a manner as to minimize the threat to non-target species by placement in those areas frequently used by target wildlife, using baits or lures that were as species specific as possible, and modifying individual methods to exclude non-targets from capture. With all live-capture devices, WS could release non-target wildlife captured on site if those animals were determined to be able to survive following release. WS developed SOPs through the scoping process of the EA to ensure the lethal removal of non-target wildlife would be minimal during the use of methods to capture target birds.

The use of firearms and euthanasia methods would essentially be selective for target species since a WS' employee would identify the bird prior to the application of the method. WS would apply euthanasia methods through direct application to target bird species. Therefore, the use of those methods would not affect non-target species.

The methods described in Appendix B of the EA (USDA 2010) all have a high level of selectivity and could be employed using SOPs to ensure impacts to non-targets would be minimal. The unintentional take of non-targets has not occurred by WS during activities conducted since issuing the Decision and FONSI for the EA. Based on the methods available to resolve bird damage and/or threats, WS does not anticipate the number of non-targets taken (killed) to reach a magnitude where declines in those species' populations would occur. Therefore, take under the proposed action of non-targets would not cumulatively affect non-target species, including T&E species. WS has reviewed the T&E species listed by the USFWS, the National Marine Fisheries Service, and the NCWRC. Since the development of the EA, the USFWS, the National Marine Fisheries Service, and the NCWRC have not listed additional species as threatened or endangered in the State. Thus, WS' determination of no adverse effect would still be appropriate for the proposed action for those threatened or endangered species addressed in the EA. WS would continue to monitor the list of T&E species occurring in North Carolina. Cumulative effects would be minimal on non-targets from any of the alternatives discussed.

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

Non-Chemical Methods

All non-chemical methods described in Appendix B of the EA would be used within a limited time frame, would not be residual, and do not possess properties capable of inducing cumulative effects on human health and safety. WS would use all non-chemical methods after careful consideration of the safety of those employees employing methods and the public. WS would employ all capture methods where human activity was minimal and warning signs would be placed in conspicuous areas, when appropriate, to ensure the safety of the public. Capture methods also require direct contact to trigger, which ensures those methods, when left undisturbed, would have no effect on human safety. WS would only use those methods agreed upon by the requesting entities. WS would provide information on the safety of methods

to cooperating entities 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 birds. Although hazards do exist from the use of firearms, WS would train employees in the safe use of firearms to ensure the safety of personnel and the public.

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

To reduce risks to human safety and property damage from bullets passing through the target animal, the use of firearms would be applied in such a way (*e.g.*, caliber, bullet weight, distance) to ensure the bullet would not pass through. When using firearms, the retrieval of carcasses for proper disposal would be 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 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 retrieval of the carcass was not possible. 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 remains 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 at several shooting ranges where high concentrations of lead shot accumulation occurred because of intensive target shooting. 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. Stansley et al. (1992) believed the lead contamination from the sample collected near the parking lot was due to runoff from the parking lot, and not from the shooting range areas. The study also indicated that even when lead shot was highly accumulated in areas with permanent water bodies present, the lead did not necessarily cause elevated lead 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). The crusty lead oxide deposits that form on the surface of bullets and shot distributed across the landscape serves to reduce the potential for ground or surface water contamination further (Craig et al. 1999). Those studies suggest that, given the very low amount of lead deposited and the concentrations that could occur from WS' activities to

reduce bird damage using firearms, lead contamination of water from such sources would be minimal to nonexistent.

WS' assistance with removing birds would not be additive to the environmental status quo since those birds lethally removed by WS using firearms could potentially be lethally removed by other entities using the same method in the absence of WS' involvement. Based on current information, the risks associated with lead bullets or shot 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.

WS has received no reports or documented any adverse effects to human safety from damage management activities conducted by WS since the completion of the Decision and FONSI for the EA. WS would continue to train personnel to be proficient in the use of non-chemical 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 affect human safety.

Chemical Methods

Chemical methods considered in the EA to manage damage or threats of damage associated with birds included the avicide DRC-1339, Avitrol, alpha-chloralose, mesurol, nicarbazin, and taste repellents. However, from FY 2010 through FY 2012, WS has not employed those chemical methods to address requests for assistance with bird damage. Therefore, the evaluation in the EA of the potential cumulative effects associated with those chemical methods remains appropriate.

As discussed in the EA, WS could use carbon dioxide to euthanize live-captured birds. Carbon dioxide is naturally occurring in the environment ranking as the fourth most abundant gas in the atmosphere. However, in high concentrations, carbon dioxide causes hypoxia due to the depression of vital centers and the American Veterinary Medical Association (2013) considers compressed carbon dioxide as a moderately rapid form of euthanasia. Carbon dioxide is commercially available as a compressed bottled gas. Carbon dioxide is a colorless, odorless, non-flammable gas used for a variety of purposes, such as in carbonated beverages, dry ice, and fire extinguishers. Although some hazards exist from the inhalation of high concentrations of carbon dioxide during application for euthanasia purposes, when used appropriately, the risks of exposure would be minimal. Since carbon dioxide is a common gas found in the environment, the use of and/or recommending the use of carbon dioxide for euthanasia purposes would not have cumulative impacts.

Issue 4 - Effects on the Aesthetic Values of Birds

The activities of WS could result in the dispersal or removal of target birds from those areas where damage or threats were occurring, which could reduce the aesthetic value of those bird species in that immediate area.

The USFWS and the NCWRC establish and regulate bird population objectives through the regulating of take after consideration of other known mortality factors. Therefore, WS has no direct impact on the status of a bird population since all take by WS would occur at the discretion of the USFWS and the NCWRC. Since those people seeking assistance could remove birds from areas where damage was occurring with or without a permit from the USFWS and the NCWRC, WS' involvement would have no effect of the aesthetic value of birds in the area where damage was occurring. When damage caused by birds has occurred, any removal of birds by the property or resource owner would likely occur whether WS was involved with removing the birds or not. Therefore, WS would not expect activities to have any

cumulative effects on this element of the human environment if occurring at the request of a property owner and/or manager.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods

WS continues to seek new methods and ways to improve current technology to address 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.

Appendix B of the EA discusses those methods that would be available to reduce or prevent damage caused by target bird species (USDA 2010). Between FY 2010 and FY 2012, WS employed methods as humanely as possible to minimize suffering and distress. WS would also continue to implement the SOPs discussed in the Chapter 3 of the EA to ensure employees employ methods as humanely as possible (USDA 2010). WS would continue to evaluate methods to ensure SOPs remain appropriate to minimize suffering and to ensure that WS addresses wildlife captured in a timely manner to minimize distress.

Issue 6 - Effects of Bird Damage Management Activities on the Regulated Harvest of Birds

As discussed in the EA, the magnitude of the proposed annual take by WS on the populations of target species was low when compared to the total harvest of birds and when compared to the available population data for those species. Since the USFWS and the NCWRC regulate take of birds, the take of birds by WS that could occur annually and cumulatively would occur pursuant to bird population objectives established in the State. WS' take of birds (combined take) annually to alleviate damage would be a minor component of the known annual take that occurs during the harvest seasons.

With oversight of bird take, the USFWS and the NCWRC maintains the ability to regulate take by WS to meet management objectives for birds in the State. Therefore, the USFWS and the NCWRC consider the cumulative take of birds as part of objectives for bird populations in the State.

LIST OF PREPARERS AND REVIEWERS

Jon Heisterberg	USDA/APHIS/WS, State Director, Raleigh, North Carolina
Todd Menke	USDA/APHIS/WS, Assistant State Director, Raleigh, North Carolina
Ryan Wimberly	USDA/APHIS/WS, Staff Wildlife Biologist, Madison, Tennessee
Barbara Schellinger	USDA/APHIS/WS, Staff Wildlife Biologist, Raleigh, North Carolina

LIST OF PERSONS CONSULTED

Carmen Simonton	USFWS, Chief, Migratory Bird and Eagle Permit Office, Atlanta, Georgia
Michelle Outlaw	USFWS, Migratory Bird and Eagle Permit Office, Atlanta, Georgia
Sara Schweitzer	NCWRC, Coastal Waterbird Biologist, New Bern, North Carolina
Joe Fuller	NCWRC, Migratory Game Bird Coordinator, Edenton, North Carolina

LITERATURE CITED

AVMA. 2013. AVMA guidelines on euthanasia. American Veterinary Medical Association. http://www.avma.org/issues/animal_welfare/euthanasia.pdf. Accessed on March 6, 2013.

Badyaev, A. V., V. Belloni, and G. E. Hill. 2012. House Finch (*Haemorhous mexicanus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/046.

Becker, P. H. 1995. Effects of coloniality on gull predation on common tern (*Sterna hirundo*) chicks. Colonial Waterbirds 18:11-22.

Belant, J. L., T. W. Seamans, S. W. Gabrey, and S. K. Ickes. 1993. Importance of landfills to nesting herring gulls. Condor 95:817-830.

Blokpoel, H., and G.D. Tessier. 1986. The ring-billed gull in Ontario: a review of a new problem species. Occasional Paper Number 57. Canadian Wildlife Service. Ottawa, Ontario. 34 pp.

Blokpoel, H., and G. D. Tessier. 1992. Control of ring-billed gulls and herring gulls nesting at urban and industrial sites in Ontario, 1987-1990. Proceedings of the Eastern Wildlife Damage Conference 5: 51-57.

Brauning, D. W., ed. 1992. Atlas of breeding birds in Pennsylvania. Univ. Pittsburgh Press, Pittsburgh, Pennsylvania. 484 pp.

Brown, S., C. Hickey, B. Harrington, and R. Gill, editors. 2001. The U.S. Shorebird Conservation Plan, 2nd edition. Manomet Center for Conservation Science, Manomet, Massachusetts, USA.

Burger, J. 1996. Laughing Gull (*Leucophaeus atricilla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/225.

Burger, J., and M. Gochfeld. 2002. Bonaparte's Gull (*Chroicocephalus philadelphia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/634.

Cleary, E.C., R.A. Dolbeer, and S.E. Wright. 2005. Wildlife strikes to civil aircraft in the United States, 1990–2004. U.S. Dept. of Trans., Federal Aviation Admin., Serial Report No. 11 DOT/FAA/AS/00-6 (AAS-310). Washington, D.C. 53 pp.

Craig, J. R., J. D. Rimstidt, C. A. Bonnaffon, T. K. Collins, and P. F. Scanlon. 1999. Surface water transport of lead at a shooting range. Bulletin of Environmental Contamination and Toxicology 63:312–319.

DeVault, T. L., J. L. Belant, B. F. Blackwell, and T. W. Seamans. 2011. Interspecific variation in wildlife hazards to aircraft: Implications for airport wildlife management. Wildlife Society Bulletin 35:394-402.

Dolbeer, R. A. 1994. Blackbirds. Pages E25–E32 *in* S. E. Hygnstrom, R. E. Timm, and G. E. Larson, editors. Prevention and Control of Wildlife Damage. University of Nebraska, Lincoln, Nebraska, USA. http://digitalcommons.unl.edu/icwdmhandbook/. Accessed September 9, 2013.

Dolbeer, R.A., and R.A. Stehn. 1983. Population status of blackbirds and starlings in North America, 1966-81. Denver Wildl. Res. Cent., Bird Damage Res. Rep. No. 294. 61pp.

Dolbeer, R.A. 2009. Birds and aircraft: Fighting for airspace in ever more crowded skies. Human-Wildlife Conflicts 3:165-166.

Dolbeer, R. A., S. E. Wright, J. Weller, and M. J. Begier. 2012. Wildlife Strikes to civil aircraft in the United States 1990–2010, Serial report 17. U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Safety and Standards, Washington, D.C., USA.

Dolbeer, R. A., S. E. Wright, J. Weller, and M. J. Begier. 2013. Wildlife Strikes to civil aircraft in the United States 1990–2012, Serial report 19. U.S. Department of Transportation, Federal Aviation Administration, Office of Airport Safety and Standards, Washington, D.C., USA.

Drury, W. H. 1973. Population changes in New England seabirds. Bird Banding 44:267-313.

Erwin, R. M. 1979. Historical breeding records of colonial seabirds and wading birds, 1900 – 1977, Cape Elizabeth, Maine to Virginia. Supplement to final report prepared for U.S. Fish and Wildlife Service, Coastal Ecosystems Project, Newton Corner, Massachusetts, USA.

Farnsworth, G., G. A. Londono, J. U. Martin, K. C. Derrickson, and R. Breitwisch. 2011. Northern Mockingbird (*Mimus polyglottos*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/007.

FAA. 2013. National Wildlife Strike Database. http://wildlife.faa.gov/default.aspx. Accessed March 1, 2013.

Glahn, J. F., and E .A. Wilson. 1992. Effectiveness of DRC-1339 baiting for reducing blackbird damage to sprouting rice. Proc. East. Wildl. Damage Cont. Conf. 5:117-123.

Gochfeld, M., and J. Burger. 1994. Black Skimmer (*Rynchops niger*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/108.

Gowaty, P. A., and J. H. Plissner. 1998. Eastern Bluebird (*Sialia sialis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/381.

Guillemette, M., and P. Brousseau. 2001. Does culling predatory gulls enhance the productivity of breeding common terns? Journal of Applied Ecology 38:1-8.

Hayman, P., J. Marchant, and T. Prater. 1986. Shorebirds: An identification guide to the waders of the world. Houghton Mifflin Company, Boston, Massachusetts. 412 pp.

Henny, C. J. 1990. Mortality. Pp. 140 - 151 *in* I. Newton, P. Olsen, and T. Pyrzalowski, eds., Birds of Prey. Facts on File, New York, New York. 240 pp.

Hothem, R. L., R. W. DeHaven, and S. D. Fairaizl. 1988. Bird damage to sunflower in North Dakota, South Dakota, and Minnesota, 1979–1981. United States Department of the Interior: Fish and Wildlife Technical Report 15, Washington, D.C., USA.

Houston, C. S., C. R. Jackson, and D. E. Bowen, Jr. 2011. Upland Sandpiper (*Bartramia longicauda*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/580.

Hunter, W. C., W. Golder, S. Melvin, and J. Wheeler. 2006. Southeast United States Regional Waterbird Conservation Plan. Waterbird Conservation for the Americas. http://www.waterbirdconservation.org/. Accessed June 10, 2013.

Hunter, W. C., J. Collazo, B. Noffsinger, B. Winn, D. Allen, B. Harrington, M. Epstein, and J. Salvia. 2002. Southeastern Coastal Plains-Caribbean Region Report U.S. Shorebird Conservation Plan. U.S. Fish and Wildlife Service, 1875 Century Boulevard, Atlanta, Georgia, USA.

IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. www.iucnredlist.org. Accessed July 3, 2013.

Jackson, B. J., and J. A. Jackson. 2000. Killdeer (*Charadrius vociferus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/517.

Kendall, R. J., T. E. Lacher, Jr., C. Bunck, B. Daniel, C. Driver, C. E. Grue, F. Leighton, W. Stansley, P. G. Watanabe, and M. Whitworth. 1996. An ecological risk assessment of lead shot exposure in non-waterfowl avian species: Upland game birds and raptors. Environ. Toxicol. and Chem. 15:4-20.

Kirk, D. A., and M. J. Mossman. 1998. Turkey vulture (*Cathartes aura*) in A. Poole and F. Gill, editors. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York, USA. http://bna.birds.cornell.edu/bna/species/339.

Kress, S., E. Weinstein, and I. C. T. Nisbet, eds. 1983. The status of tern populations in northeastern United States and adjacent Canada. Colonial Waterbirds 6:84-106.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. Acosta Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliott, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheller, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, D.C., USA.

Laidlaw, M. A., H. W. Mielke, G. M. Filippelli, D. L. Johnson, and C. R. Gonzales. 2005. Seasonality and children's blood lead levels: Developing a predictive model using climatic variables and blood lead data from Indianapolis, Indiana, Syracuse, New York, and New Orleans, Louisiana, USA. Environmental Health Perspectives 113:793–800.

LeGrand, H., J. Haire, A. Iyoob, and T. Howard. 2013. Birds of North Carolina: Their distribution and abundance. http://www.carolinabirdclub.org/ncbirds/accounts.php. Accessed September 18, 2013.

Linnell, M. A., M. R. Conover, and T. J. Ohashi. 1999. Biases in bird strike statistics based on pilot reports. Journal of Wildlife Management 63:997–1003.

Lowther, P. E. 1993. Brown-headed Cowbird (*Molothrus ater*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/047.

Mid-Atlantic, New England, Maritimes Waterbird Conservation Plan. 2006. Waterbird Conservation Plan: 2006–2010 Mid-Atlantic / New England / Maritimes Region. A plan for the Waterbird Conservation for the Americas Initiative. http://www.waterbirdconservation.org/pdfs/regional/manem_binder_appendix_1b.pdf. Accessed September 18, 2013.

Milleson, M. P., S. A. Shwiff, and M. L. Avery. 2006. Vulture-cattle interactions – A survey a Florida ranchers. Proc. Vertebr. Pest Conf. 22:231-238.

Mueller, H. 1999. Wilson's Snipe (*Gallinago delicata*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/417.

NASS. 2011. North Carolina Agricultural Statistics. National Agricultural Statistics Service and North Carolina Department of Agriculture and Consumer Services. Raleigh, North Carolina. 147 pp.

National Audubon Society. 2010. The Christmas Bird Count Historical Results [Online]. Available http://www.christmasbirdcount.org. Accessed on June 10, 2013.

NCWRC. 2005. Colonial waterbirds fact sheet. North Carolina Wildlife Resources Commission. Raleigh, North Carolina, USA.

O'Connell, T. J., and R. A. Beck. 2003. Gull predation limits nesting success of terns and skimmers on the Virginia barrier islands. Journal of Field Ornithology 74:66-73.

Otis, D. L., J. H. Schulz, and D. Miller. 2008. Mourning Dove (*Zenaida macroura*) in A. Poole and F. Gill, editors. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York, USA. http://bna.birds.cornell.edu/bna/species/117.

Partners in Flight Science Committee 2013. Population Estimates Database, version 2013. Available at http://rmbo.org/pifpopestimates. Accessed September 20, 2013.

Patton, S.R. 1988. Abundance of gulls at Tampa Bay landfills. Wilson Bulletin 100:431-442.

Peer, B. D., and E. K. Bollinger. 1997. Common Grackle (*Quiscalus quiscula*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/271.

Pierotti, R. J., and T. P. Good. 1994. Herring Gull (*Larus argentatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/124.

Pollet, I. L., D. Shutler, J. Chardine, and J. P. Ryder. 2012. Ring-billed Gull (*Larus delawarensis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/033.

Rabenhold, P. P., and M. D. Decker. 1989. Black and turkey vultures expand their ranges northward. The Eyas. 12:11-15.

Raftovich, R.V., and K.A. Wilkins. 2013. Migratory bird hunting activity and harvest during the 2011-12 and 2012-13 hunting seasons. U.S. Fish and Wildlife Service, Laurel, Maryland, USA.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2012. The North American Breeding Bird Survey, Results and Analysis 1966 - 2011. Version 07.03.2013 USGS Patuxent Wildlife Research Center, Laurel, Maryland, USA.

Schweitzer, S. H. 2011. Waterbird Investigations and Management. Pp. 63-83 *in* North Carolina SWG 2008 Grant T-12-R Final Performance Report, North Carolina Wildlife Resources Commission, Raleigh, North Carolina, USA.

Seamans, M. E., R. D. Rau, and T. A. Sanders. 2013. Mourning dove population status, 2013. U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Washington, D.C., USA.

Shields, M. 2002. Brown Pelican (*Pelecanus occidentalis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/609.

Slate, D. A., R. Owens, G. Connolly, and G. Simmons. 1992. Decision making for wildlife damage management. Transactions of the North American Wildlife and Natural Resources Conference 57:51–62.

Stansley W., L. Widjeskog, and D. E. Roscoe. 1992. Lead contamination and mobility in surface water at trap and skeet ranges. Bulletin of Environmental Contamination and Toxicology 49:640–647.

Thompson, B. C., J. A. Jackson, J. Burger, L. A. Hill, E. M. Kirsch, and J. L. Atwood. 1997. Least Tern (*Sternula antillarum*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/290.

USDA. 2003*a*. Environmental Assessment: Canada goose damage management. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Raleigh, North Carolina, USA.

USDA. 2003*b*. Environmental Assessment: Bird damage management. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Raleigh, North Carolina, USA.

USDA. 2010. Environmental Assessment: Reducing bird damage through an integrated wildlife damage management program in the state of North Carolina. United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services. Raleigh, North Carolina.

USFWS. 1985. Recovery plan for the California least tern, *Sterna antillarum brownii*. United States fish and Wildlife Service, Portland, Oregon. 112 pp.

USFWS. 1990. Recovery plan for the interior population of the least tern (*Stern antillarum*). United States Fish and Wildlife Service, Twin Cities, Minnesota. 90 pp.

USFWS. 2003. Final Environmental Impact Statement: Double-crested Cormorant Management. United States Dept. of the Interior, USFWS, Div. of Migratory Bird Management, 4401 N. Fairfax Drive MS 634, Arlington, Virginia, USA.

USFWS. 2005. Final Environmental Impact Statement, Resident Canada goose Management. U.S. Department of the Interior, Washington, D.C., USA. http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/cangeese/finaleis.htm. Accessed February 4, 2013.

USFWS. 2009. Environmental Assessment: Extended management of double-crested cormorants under 50 CFR 21.47 and 21.48. U.S. Department of the Interior, Washington, D.C., USA.

USFWS. 2010. Environmental Assessment: Proposal to permit take as provided under the Bald and Golden Eagle Protection Act. U.S. Department of the Interior, Washington, D.C., USA.

Verbeek, N.A.M. 1977. Comparative feeding ecology of herring gulls *Larus argentatus* and lesser black-backed gulls *Larus fiscus*. Ardea 65:25-42.

Walsh, J., V. Elia, R. Kane, and T. Halliwell. 1999. Birds of New Jersey. New Jersey Audubon Society, Bernardsville, New Jersey. 704 pp.

Wilbur, S. R. 1983. The status of vultures in the western hemisphere. Pp. 113-123. *in* Vulture biology and management. Eds. By S.R. Wilbur and J.A. Jackson. University of California Press. Berkeley, California, USA.

Wright, S.E., and R.A. Dolbeer. 2005. Percentage of wildlife strikes reported and species identified under a voluntary reporting system. 2005 Bird Strike Committee-USA/Canada 7th Annual Meeting, Vancouver, British Columbia, Canada. Paper 11.