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

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

In Cooperation with:

United States Department of Interior
Unites States Fish and Wildlife Service

Vermont Department of Fish and Wildlife

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I. INTRODUCTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program prepared an environmental assessment (EA) to evaluate potential impacts to the quality of the human environment from the implementation of a management program to address damage to property, agricultural resources, natural resources, and threats to human safety caused by birds in Vermont (USDA 2004). The EA evaluated the need for damage management and the relative effectiveness of four alternatives to meet that proposed need, while accounting for the potential environmental effects of those activities. WS' proposed action in the EA evaluates an integrated damage management program in the State to fully address the need for resolving damage caused by birds while minimizing impacts to the human environment. A supplement to the EA was prepared to addresses additional information that had become available since the completion of the EA and to address an increasing need to alleviate damage associated with gulls in the State (USDA 2007). WS, in cooperation with the United State Fish and Wildlife Service (USFWS), is preparing this supplement to address a increasing need to address cormorant damage occurring within the State.

The EA analyzes the effects of WS' activities to reduce damage and threats associated with several bird species. Bird species addressed in the EA include double-crested cormorants (*Phalacrocorax auritus*), great blue herons (*Ardea herodias*), black vultures (*Coragyps atratus*), turkey vultures (*Cathartes aura*), Canada geese (*Branta canadensis*), snow geese (*Chen caerulescens*), mallards (*Anas platyrhynchos*), domestic waterfowl (ducks and geese), northern harriers (*Circus cyaneus*), sharp-shinned hawks (*Accipiter striatus*), Cooper's hawks (*Accipiter cooperii*), Northern goshawks (*Accipiter gentilis*), rough-legged hawks (*Buteo lagopus*), red-shouldered hawks (*Buteo lineatus*), broad-winged hawks (*Buteo platypterus*), red-tailed hawks (*Buteo jamaicensis*), American kestrels (*Falco sparverius*), wild turkeys (*Meleagris gallopavo*), killdeer (*Charadrius vociferus*), ring-billed gulls (*Larus delawarensis*), herring gulls (*Larus argentatus*), rock pigeons (*Columbia livia*), great black-backed gulls (*Larus marinus*), barn owls (*Tyto alba*), Eastern screech owls (*Otus asio*), great horned owls (*Bubo virginianus*), barred owls (*Strix varia*), Northern saw-whet owls (*Aegolius acadicus*), long-eared owls (*Asio otus*), downy woodpeckers (*Picoides pubescens*), hairy woodpeckers (*Picoides villosus*), pileated woodpeckers (*Dryocopus pileatus*), American crows (*Corvus brachyrhynchos*), European starlings (*Sturnus vulgaris*), snow buntings (*Plectrophenax nivalis*), red-winged blackbirds (*Agelaius phoeniceus*), common grackles (*Quiscalus quiscula*), brown-headed cowbirds (*Molothrus ater*), and house sparrows (*Passer domesticus*).

II. AUTHORITY AND COMPLIANCE

WS' activities to reduce damage and threats associated with birds are regulated by federal, State, and local laws and regulations. The authority of WS and other agencies along with the compliance with relevant laws and regulations are discussed in detail in Section 1.1 of the EA (USDA 2004) and the 2007 supplement to the EA (USDA 2007). WS' activities are also conducted consistent with relevant Executive Orders which were also discussed in Section 1.1 of the EA (USDA 2004).

III. PURPOSE

The purpose of the EA and the 2007 supplement to the EA will remain as addressed in those documents (USDA 2004, USDA 2007). This proposed supplement to the EA examines potential environmental impacts of WS' program as it relates to: 1) a need to increase cormorant damage management activities to restore vegetation and wildlife diversity on islands in Vermont under the Lake Champlain Islands Wildlife Management Area Long-Range Management Plan developed by the Vermont Fish and Wildlife Department (VFWD) (VFWD 2006), 2) a need to reduce increasing requests for assistance to reduce damage to private property and to reduce threats to human safety associated with cormorants, 3) a need to reduce damage to the Lake Champlain fisheries associated with cormorants, and 4) new data that have

become available from research findings and data gathering since the issuance of the 2004 Decision/FONSI, the 2007 Decision/FONSI, and the annual monitoring reports.

IV. NEED FOR ACTION

A description of the need for action to address damage and threats associated with birds in Vermont is provided in the EA (USDA 2004) and in the 2007 supplement to the EA (USDA 2007). The need for action addressed in the EA and the 2007 supplement to the EA remains applicable to this proposed supplement to the EA. The need for action is based on a need to manage bird damage to agricultural resources, natural resources, and property, including threats to human safety associated with birds. Additional information related to damage and threats associated with double-crested cormorants can be found in the cormorant management Final Environmental Impact Statement (FEIS) developed by the USFWS (USFWS 2003). Since the completion of the EA in 2004, WS has been requested to assist in the implementation of the Lake Champlain Islands Wildlife Management Area Long-Range Management Plan developed by the VFWD. This proposed supplement to the EA addresses the need for an increase in cormorant damage management activities throughout Vermont, including those activities addressed in the management plan for Lake Champlain Islands Wildlife Management Area.

To meet objectives of the Lake Champlain Islands Management Plan, the VFWD has requested WS' assistance in managing and dispersing cormorants to restore vegetation and wildlife diversity on islands identified in the Plan. Increasing concerns from private landowners have also required management and dispersal effort from WS, along with increasing fishery concerns. This supplement will analyze the potential for environmental impacts from an increasing need for cormorant damage management activities to achieve management objects, reduce habitat damage, prevent the establishment of new cormorant colonies, address fishery concerns, and continue research throughout the State.

As stated in the cormorant management FEIS (USFWS 2003), the recent increase in the North American cormorant population and subsequent range expansion has been well-documented, along with concerns of negative impacts associated with the expanding population of cormorants. Wires et al. (2001) and Jackson and Jackson (1995) have suggested that the current cormorant resurgence may be, at least in part, a population recovery following years of DDT-induced reproductive suppression and unregulated take prior to protection under the Migratory Bird Treaty Act (MBTA).

Double-crested cormorants range throughout North America, from the Atlantic coast to the Pacific coast. During the last 20 years, the cormorant population has expanded to an estimated 372,000 nesting pairs; with the United States population (breeding and non-breeding birds) conservatively estimated to be greater than 1 million birds (Tyson et al. 1999). The USFWS estimates the current continental population at approximately 2 million birds (USFWS 2003). Tyson et al. (1999) found that the cormorant population increased about 2.6% annually during the early 1990s. The greatest increase was in the Interior region which was the result of a 22% annual increase in the number of cormorants in Ontario and those States bordering the Great Lakes (Tyson et al. 1999). From the early 1970s to the early 1990s, the Atlantic population of double-crested cormorants increased from about 25,000 pairs to 96,000 pairs (Hatch 1995). While the number of cormorants in the Atlantic region declined 6.5% overall during the early- to mid-1990s, populations have continued to grow rapidly throughout New England (USFWS 2003). The number of breeding pairs of cormorants in the Atlantic and Interior populations is estimated at over 85,510 and 256,212 nesting pairs, respectively (Tyson et al. 1999).

Breeding Bird Survey (BBS) data indicates the number of cormorants observed along those routes surveyed has increased annually since 1966 in the United States and in the Eastern BBS Region estimated at 5.1% and 4.3%, respectively which are statistically significant increases (Sauer et al. 2008). From 1999 to 2008, the average number of nesting cormorant pairs observed on Young Island and Four

Brothers Islands on Lake Champlain was 4,079 pairs per year (D. Capen, University of Vermont, unpublished data). The breeding pairs estimate for those islands does not include sub-adults and non-breeding birds. In 2008, there were 4,311 breeding pairs of cormorants nesting on Lake Champlain (D. Capen, University of Vermont, unpublished data) which equates to 8,622 adult cormorants nesting on the Lake (*i.e.*, one pair equals two adult cormorants). Estimates of 0.6 to 4.0 non-breeding cormorants per breeding pair have been used for several populations (see citations in Tyson et al. 1999). Therefore, the cormorant population for Lake Champlain could range from 11,209 to 25,866 cormorants using those estimates cited in Tyson et al. (1999).

The rapid increase in double-crested cormorant populations over the last 25 years has led to an increase in conflicts between humans and cormorants. As the population of double-crested cormorants has increased, so has concern for sport fishery populations (USFWS 2003). Cormorants can have a negative impact on recreational fishing on a localized level (USFWS 2003). Recreational fishing benefits local and regional economies in many areas of the United States, with some local economies relying heavily on income associated with recreational fisheries (USFWS 2003). The collapse of sport fisheries can have negative economic impacts on businesses and can result in job losses (Shwiff and DeVault 2009).

The degree to which cormorant predation affects sport fishery populations in a given body of water is dependent on a number of variables, including the number of birds present, the time of year at which predation is occurring, prey species composition, and physical characteristics such as depth or proximity to shore (which affect prey accessibility). In addition to cormorant predation, environmental and human-induced factors affect aquatic ecosystems. Those factors can be classified as biological/biotic (*e.g.*, overexploitation, exotic species), chemical (*e.g.*, water quality, nutrient and contaminant loading), or physical/abiotic (*e.g.*, dredging, dam construction, hydropower operation, siltation). Such activities may lead to changes in species density, diversity, and/or composition due to direct effects on year class strength, recruitment, spawning success, spawning or nursery habitat, and/or competition (USFWS 1995).

Potential Cormorant Impacts to the Lake Champlain Fishery

Cormorants are opportunistic feeders that prey on a wide diversity of fish species (USFWS 2003). The magnitude of impact of cormorant predation on fish in a given body of water is dependent on a number of variables, but in select circumstances, cormorants can have a negative impact on recreational fishing on a localized level (USFWS 2003) resulting in a need to reduce those negative impacts.

Based on surveys conducted in 2008, an estimated 8,622 adult cormorants are present on Lake Champlain during the breeding season for cormorants. An adult cormorant consumes an average of 320 grams of fish per day with a range from 208 grams to 537 grams (Hatch and Weseloh 1999). Cormorants start arriving on Lake Champlain in mid-March and stay until mid-October when cormorants migrate from the Lake (Duerr 2007). If adult breeding cormorants nesting on islands on Lake Champlain fed exclusively on fish in the Lake during the breeding season and were present on the Lake from mid-March to mid-October, those cormorants would consume over 1.4 million pounds of fish based on the average daily consumption of fish which does not include those fish eaten by non-breeding adults and fledglings that are present on the Lake.

Lake Champlain had an estimated 277,759 angler days in 2007, which is down from a high of 482,170 angler days in 1988. The New York State Department of Environmental Conservation (NYSDEC) defines an angler day as any part of a day that a person spent fishing (NYSDEC 2009). The total estimated expenditures for anglers fishing in NYSDEC Region 5, which includes Lake Champlain, were over $56 million (NYSDEC 2009). In 1997, the owners of the 98 fishing-related businesses within 10 miles of Lake Champlain estimated that $5.6 million of their total income originated from anglers using Lake Champlain (Lake Champlain Steering Committee 2003).

The health of a lake's fishery can have an effect on the economies surrounding that lake. For example, when the walleye (*Sander vitreus*) and yellow perch (*Perca flavescens*) fishery collapsed on Oneida Lake in New York after the colonization of the lake by cormorants (VanDeValk et al. 2002, Rudstam et al. 2004), research biologists with the National Wildlife Research Center sought to identify the actual monetary damage associated with the declines of those sport fish populations. The total estimated revenue lost in the Oneida Lake region due to cormorant damage from 1990 to 2005 ranged from $122 million to $539 million. That lost revenue from the collapse of the fisheries resource resulted in the loss of 3,284 to 12,862 jobs in the Oneida Lake region from 1990 to 2005 (Shwiff and DeVault 2009). In 1998, the WS program in New York was requested to assist with managing damage associated with cormorants on Oneida Lake. Cormorant damage management activities conducted on Oneida Lake from 1998 to 2005 prevented the loss of an estimated $48 million to $171 million in revenue which allowed between 1,446 and 5,014 jobs to be retained in the Oneida Lake region (Shwiff and DeVault 2009).

Colonial waterbird management (including gull and cormorant management) would likely benefit the fish population on Lake Champlain and maintain a sustainable sport fishing community, especially given the decline in the number of angling days on the Lake. Cormorants can alter and redistribute nearshore fish resources which results in the broad scale alteration of prey-fish resources (Casselman and Marcogliese 2005). In addition, studies indicate that there are negative relationships between nearshore fish abundance and fish consumption by nesting cormorants (Ridgway et al. 2006*a*, Ridgway et al. 2006*b*). Anglers often return to areas where they were successful in catching fish. Reducing cormorant predation rates on two of the top four fish targeted in Lake Champlain (bass and yellow perch) by anglers (NYSDEC 2009) could result in greater angler satisfaction which in turn could increase the number of angler days spent on the Lake to the benefit of the local economy.

Effects on Natural Resources

Habitat degradation occurs primarily in areas where colonial waterbirds nest or where the gregarious roosting behavior of birds occurs. The degradation of habitat occurs from the continuous accumulation of fecal droppings that occurs under nesting colonies of birds or under areas where birds consistently roost. Over time, the accumulation of fecal droppings under areas where colonial waterbirds nest or roost, such as cormorants and herons, can lead to the loss of vegetation due to the ammonium nitrogen found in the fecal droppings of birds. Ammonium toxicity from fecal droppings may be an important factor contributing to the declining presence of vegetation on some islands in the Great Lakes (Hebert et al. 2005). The combined activities of stripping leaves and branches for nesting material, the weight of nests of many colonial waterbirds breaking branches, and the accumulation of feces under areas where roosting and nesting occurs can lead to the death of surrounding vegetation within three to 10 years of areas being occupied by colonial waterbirds (Lewis 1929, Lemmon et al. 1994, Weseloh and Ewins 1994, Bédard et al. 1995, Weseloh and Collier 1995, Weseloh et al. 1995, Korfanty et al. 1999, Hebert et al. 2005). The establishment of cormorant colonies on islands in the Great Lakes has threatened the unique vegetative characteristic of many of those islands (Hebert et al. 2005). In some cases, the establishment of colonial waterbird nesting colonies on islands has led to the complete denuding of the island of vegetation (USFWS 2003). The removal of vegetation can lead to an increase in erosion of the island and can be aesthetically displeasing to recreational users.

Lewis (1929) considered the killing of trees by nesting cormorants to be very local and limited, with most trees having no commercial timber value. However, tree damage may be perceived as a problem if those trees are rare species, or aesthetically valued (Bédard et al. 1999, Hatch and Weseloh 1999). In addition to habitat degradation, nesting colonial waterbirds can adversely affect other wildlife species. Cormorants are known to displace other colonial nesting bird species such as black-crowned night herons (*Nycticorax nycticorax*), egrets, great blue herons, gulls, common terns (*Sterna hirundo*), and Caspian

terns (*S. caspia*) through habitat degradation and nest site competition (USFWS 2003). Cuthbert et al. (2002) examined potential impacts of cormorants on great blue herons and black-crowned night herons in the Great Lakes region and found that cormorants have not negatively influenced breeding distribution or productivity of either species at a regional scale, but did contribute to declines in heron presence and increases in site abandonment in certain site specific circumstances.

Cormorants can have a negative impact on vegetation that provides nesting habitat for other birds (Jarvie et al. 1999, Shieldcastle and Martin 1999) and provides shelter for wildlife, including State and federally-listed threatened and endangered species (Korfanty et al. 1999). Cuthbert et al. (2002) did find that cormorants have a negative effect on normal plant growth and survival on a localized level in the Great Lakes region. Wires and Cuthbert (2001) identified vegetation die off as an important threat to 66% of the colonial waterbird sites designated as conservation sites of priority in the Great Lakes of the United States. Of the 29 priority conservation sites reporting vegetation die off as a threat, Wires and Cuthbert (2001) reported cormorants were present at 23 of those sites. Based on survey information provided by Wires et al. (2001), biologists in the Great Lakes region reported cormorants as having an impact to herbaceous layers and trees where nesting occurred. Damage to trees was mainly caused by fecal deposits, and resulted in tree die off at breeding colonies and roost sites. Impacts to the herbaceous layer of vegetation were also reported due to fecal deposition, and often this layer was reduced or eliminated from the colony site. In addition, survey respondents reported that the impacts to avian species from cormorants occurred primarily from habitat degradation and from competition for nest sites (Wires et al. 2001). Although loss of vegetation can have an adverse impact on many species, some colonial waterbirds such as pelicans and terns prefer sparsely vegetated substrates.

In Vermont, on Young Island in Lake Champlain, gulls and double-crested cormorants have displaced other species of colonial nesting birds such as black-crowned night herons, cattle egrets (*Bubulcus ibis*), snowy egrets (*Egretta thula*), American black ducks (*Anas rubripes*), mallards, common goldeneyes (*Bucephala clangula*), common mergansers (*Mergus merganser*), tree swallows (*Tachycineta bicolor*), red-winged blackbirds, common grackles, green herons (*Butorides virescens*), great blue herons, wood ducks (*Aix sponsa*), and gadwalls (*Anas strepera*) mainly through the degradation of habitat and from competition for nest sites (J. Gobeille, VFWD pers. comm. 2008).

In 1959, Young Island's habitat and vegetation was similar to the current vegetation composition of Bixby Island, which is located about 0.4 miles to the north on Lake Champlain. Eastern cottonwood (*Populus deltoids*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), basswood (*Tilia americana*), and silver maple (*Acer saccharinum*) were the dominate tree species, while raspberry (*Rubus idaeus*), blackberry (*Rubus* spp.), stag-horn sumac (*Rhus typhina*), Virginia creeper (*Parthenocissus quinquefolia*), wild grape (*Vitis* spp.), and dogwood (*Cornus* spp.) dominated the understory on Young Island. Many grasses (Family Poaceae), nettles (*Urtica* spp.), bedstraw (*Galium* spp.), wild mustard (*Sinapsis arvensis*), and trillium (*Trillium* spp.) were also found on the Island (Coulter and Miller 1968). Those vegetation communities on Young Island have been completely lost due to the impacts of colonial nesting waterbirds (especially double-crested cormorants and ring-billed gulls) that first arrived in the mid-1950s. Although very few trees exist on the Island today, cottonwoods, box elder (*Acer negundo*), and green ash make up the current tree species, with Elderberry (*Sambucus nigra*) being the dominate shrub on the Island. Stinging nettle (*Urtica dioica*) and pigweed (*Amaranthus* spp.) now dominate the Island's herbaceous plant community. Stinging nettle and pigweed are non-native invasive species.

Do to the cormorant damage to the native plant species most of the wildlife diversity has also been lost. Shorebirds still use the Island during migration for feeding and loafing because of the small cobble beach and ledge outcrops surrounding the island's perimeter. To help restore the Island back to its original habitat and increase species diversity, over 400 trees have been planted on Young Island since 2007 by

the VFWD and by WS. Due to cormorant damage management activities on the Island, no cormorants nested on the Island in 2008 while WS destroyed 103 nests on the Island in 2009 to discourage further nesting by cormorants. Due to those efforts to discourage nesting on the Island, those trees planted in 2007 are becoming well established. In addition, due to efforts to reduce cormorants nesting on the Island, five black-crowned night heron nests were confirmed on the Island in 2006 and at least four young fledged successfully. Black crown-crowned night herons had not attempted to nest on the Island since 1998. Additionally, two great blue herons nested on Young Island in 2009, which is the first time great blue herons have nested on the island since 1954, with two fledging.

Proposed Supplement to the EA

WS continues to receive requests for assistance to manage damage and threats to human safety caused by birds in Vermont. Since the federal fiscal year[1] (FY) 2004, WS has responded to requests for assistance to manage damage to property, agricultural resources, natural resources, and human safety caused by birds. This supplement to the EA analyzes the affected environment and potential impacts as the proposed activities relate to the need for an increase in damage management activities to address increasing damage and threats associated with cormorants. WS has been requested by the VFWD and by private entities to assist with implementing and meeting the objectives of the Lake Champlain Islands Management Plan.

To assist with communicating to the public the individual and cumulative impacts associated with managing increasing damage and threats associated with cormorants in Vermont; those activities are being further analyzed and addressed in this supplement to the EA. As stated in the cormorant management FEIS (USFWS 2003), the recent increase in the North American cormorant population, and subsequent range expansion, has been well-documented along with concerns of negative impacts associated with the expanding population. The need to reduce damage to agricultural resources, property, natural resources, and to reduce threats to human safety associated with cormorants is described in the cormorant management FEIS (USFWS 2003). Requests for assistance to manage damage from State and federal agencies, private property owners, and the general public continue to increase annually.

WS was a cooperating agency during the development of the management plan for Lake Champlain islands to assist the VFWD and other federal, State, and private entities with meeting objectives of the Plan. WS' involvement would include monitoring cormorant use of the Lake and conducting cormorant damage management activities as part of efforts to achieve the objectives of the Plan. The objectives of the Plan are intended to protect all State lands on Lake Champlain not just those islands listed in the Lake Champlain Islands Wildlife Management Area Long-range Management Plan. In addition to those activities described in the Lake Champlain Island Management Plan, WS could provide assistance to other federal, State, and private entities in the Lake Champlain basin when requested by monitoring cormorant use, by providing technical assistance, and by providing direct operational assistance, as well as throughout the State.

The first documented occurrence of cormorants on Lake Champlain occurred in the 1940s with nesting beginning in the early 1980s on South Sister Island and Four Brothers Islands which are on the New York side of the Lake (VFWD 2006). The nesting colonies on the Lake continued to increase during the late 1980s and early 1990s which has lead to increasing requests to resolve damage and threats associated with cormorants on the Lake (VFWD 2006). Conflicts between humans and cormorants are becoming more common in the Lake Champlain basin. In 2005, cormorant damage management activities were only conducted at two locations in Vermont (Young Island and Bixby Island) which compares to the 23 locations where damage management activities were conducted based on requests for assistance received

[1]The federal fiscal year begins on October 1 and ends on September 31 the following year.

in 2009. WS' staff spent nearly 1,227 hours on Lake Champlain in 2009, which is a 67% increase from 2005 activities. Requests for assistance concerning cormorants increased over 250% during the same time period, where technical assistance, site visits, or management actions were provided. In 2009, the WS program in Vermont dispersed 28,951 cormorants from those 23 locations compared to 25 cormorants dispersed from seven locations in 2007. WS' staff provided technical assistance to 27 resource owners in 2009.

Based on the increasing requests for assistance observed since 2005 and with the continued participation of WS to manage damage associated with cormorants under the Lake Champlain Islands Management Plan, WS expects the number of requests for assistance will continue to increase. As the number of requests for assistance increases, the number of cormorants managed by WS to address those requests is also likely to increase. Under the proposed action alternative, WS would continue to employ non-lethal and lethal methods in an integrated approach to resolving requests for assistance associated with cormorants in the State. Therefore, if the number of cormorants managed by WS annually continues to increase, the number of cormorants addressed using lethal and non-lethal methods is also likely to increase.

WS' previous management actions have included non-lethal and lethal efforts to address requests to manage damage and threats as described under the proposed action alternative in the EA (USDA 2004). WS' overall involvement with cormorant damage management, particularly on Lake Champlain, has increased from requests from private land owners on the Lake, to address research needs, and an increase in WS' participation in managing damage and threats on State-owned and private properties on the Lake. When WS' participation in management activities began on Lake Champlain, WS' involvement was anticipated to involve damage management activities only on Young Island with WS' focusing on reducing nesting on the Island by cormorants to restore vegetation and species diversity. Since damage management activities were initiated on Young Island by the WS program in Vermont, WS has been requested to conduct cormorant damage management activities on other Islands on the Lake, especially after the number of cormorants nesting on Young Island has been reduced and vegetation restoration has begun. WS also anticipates conducting cormorant damage management activities at other areas in the State to alleviate damage and threats, including at airports where cormorants can pose a threat of aircraft strikes.

As part of the requests for assistance, WS reasonably anticipates an increase in the number of birds requested to be lethally removed as part of an integrated damage management strategy to reducing damage and threats. WS also anticipates an increase in non-lethal harassment and dispersal of those bird species addressed in the proposed supplement as part of the increasing requests for assistance.

V. RELATIONSHIP OF THE EA TO OTHER ENVIRONMENTAL DOCUMENTS

Information from the following documents has been incorporated by reference into the EA and this proposed supplement.

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

Light Goose Management Final Environmental Impact Statement: The USFWS has also prepared a FEIS to address the management of snow geese and Ross's geese (USFWS 2007). The preferred

alternative in the FEIS modified existing regulations to allow additional hunting methods to harvest snow geese and Ross's geese within the current migratory bird hunting season frameworks. The preferred alternative also created a conservation order for the management of overabundant snow goose populations (50 CFR 21.60).

Double-crested Cormorant Management in the United States Final Environmental Impact Statement: To address cormorant damage to aquaculture resources and other resources, the USFWS, in cooperation with WS, prepared an EIS that evaluated alternative strategies to manage cormorant populations in the United States (USFWS 2003). The selected alternative in the FEIS modified the existing Aquaculture Depredation Order (AQDO) and established a Public Resource Depredation Order (PRDO) that allows for the take of cormorants without a depredation permit when cormorants are committing or about to commit damage to those resource types identified in the Orders. The AQDO allows cormorants to be taken in 13 States without a depredation permit to reduce depredation on aquaculture stock at private fish farms and state and federal fish hatcheries (50 CFR 21.47). The PRDO allows for the take of cormorants without a depredation permit in 24 states, including Vermont, when those cormorants cause or pose a risk of adverse affects to public resources (*e.g*., fish, wildlife, plants, and their habitats) (50 CFR 21.48). All other take of cormorants to alleviate damage requires a depredation permit issued by the USFWS. WS was a formal cooperating agency in the preparation of the FEIS and has adopted the FEIS to support WS' program decisions for its involvement in the management of cormorant damage. WS completed a Record of Decision (ROD) on November 18, 2003 (68 FR 68020). Pertinent and current information available in the FEIS have been incorporated by reference into the EA and this document.

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

Final Environmental Assessment: U.S. Fish and Wildlife Service Action to Issue a Migratory Bird Depredation Permit For the Take of Cormorants and Gulls on Lake Champlain Islands, Vermont: The USFWS has issued an EA on the issuance of a migratory bird depredation permit for the take of double-crested cormorants and several gull species on islands in Lake Champlain (USFWS 1999). The FEA analyzes the potential environmental impacts of USFWS action of issuing a permit for the take of cormorants and gulls in the Lake Champlain region of Vermont. A Decision and FONSI was again signed in 2003 selecting the preferred alternative.

Lake Champlain Islands Wildlife Management Area Long-Range Management Plan: The plan was put into place to enhance, protect and restore the ecological integrity to State lands on Lake Champlain and covers four specific islands: Young Island, Mud Island, Rock Island, and Sloop Island (VFWD 2006). The VFWD developed the plan to help maintain current native habitats and restore vegetation that cormorants and other colonial nesting waterbirds have already denuded on State lands. This plan specifically addresses non-lethal and lethal cormorant control activities by State and other governmental agencies. The plan states that the VFWD and WS will prevent the establishment of cormorant nesting attempts and if necessary the elimination of cormorants from those lands. The State lands on Lake Champlain provide important nesting and migratory habitats for waterfowl and shorebirds and provide low impact outdoor recreational opportunities, such as waterfowl hunting.

Environmental Assessment: Reducing Ring-Billed Gull, Herring Gull, Great Black-Backed Gull, and Double-Crested Cormorant Damage through an Integrated Wildlife Damage Management Program in the State Of New York: WS has developed an EA that analyzes a need for action to manage damage associated with gulls and cormorants in New York (USDA 2003). The EA identified issues associated with gull and cormorant damage management and analyzed alternatives to address those issues. After review of the analyses in the EA, a Decision and FONSI were signed in October 2003, selecting the proposed action to implement an integrated approach to manage gull and cormorant damage in the State. The EA and the Decision/FONSI were re-evaluated based on activities conducted by WS in New York since the signing of the Decision in 2003. Based on the analyses in the summary report, a new Decision and FONSI were signed in May 2009.

VI. DECISIONS TO BE MADE

Based on agency relationships, MOUs, and legislative authorities, WS was the lead agency for the EA, the 2007 supplement to the EA, and during the development of this supplement and therefore, responsible for the scope, content, and decisions made. Management of migratory birds is the responsibility of the USFWS. As the authority for the management of bird populations in the State, the USFWS was involved in the development of this supplement to the EA and can provide input throughout the preparation process to ensure an interdisciplinary approach according to the National Environmental Policy Act (NEPA) and agency mandates, policies, and regulations. The VFWD is responsible for managing wildlife in Vermont, including the establishment and enforcement of regulated hunting seasons in the State. For migratory birds, the VFWD can establish hunting seasons for those species under frameworks determined by the USFWS. WS' activities to reduce and/or prevent bird damage in the State will be coordinated with the USFWS and the VFWD which ensures WS' actions are incorporated into population objectives established by those agencies for bird populations in the State.

Based on the scope of the EA, the 2007 supplement, 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 in the State, 2) should WS continue to implement an integrated bird damage management strategy, including technical assistance and direct operational assistance, to meet the need for wildlife damage management at airports in the State, 3) if not, should WS attempt to implement one of the alternatives to an integrated damage management strategy as described in the EA, and 4) would continuing the proposed action, as addressed in this supplement, result in adverse impacts to the environment requiring the preparation of an EIS based on activities conducted since the completion of the EA and/or based on new information available addressed in this supplement to the EA.

VII. SCOPE OF ANALYSIS

The EA, the 2007 supplement, and this proposed supplement to the EA evaluate bird damage management activities in Vermont to reduce damage and threats to agricultural resources, natural resources, property, and threats to human safety. The scope of analysis remains valid as addressed in the EA and the 2007 supplement unless otherwise discussed in this proposed supplement.

Actions Analyzed

The EA, the 2007 supplement to the EA, and this supplement evaluate the need for wildlife damage management to reduce damage and threats of damage associated with birds in the State wherever such management is requested by a cooperator. The EA, the 2007 supplement, and this supplement discuss the issues associated with conducting bird damage management in the State to meet the need. In addition, those documents evaluate several 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 situation, taking action, evaluating the action, and monitoring results of the actions taken. The published article provides more detail on the processes used in WS' Decision Model. WS' programmatic FEIS (USDA 1997) provides more detail and examples of how the model is used. WS' personnel use the Decision Model to develop the most appropriate strategy to reduce damage and to determine potential environmental effects from damage management actions (Slate et al. 1992, USDA 1997, USDA 2004).

Native American Lands and Tribes

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

Period for which the EA is Valid

If the analyses in this supplement indicates an Environmental Impact Statement (EIS) is not warranted, the EA, as supplemented, would remain valid until WS, in consultation with the USFWS and the VFWD, determines that new needs for action, changed conditions, new issues, or new alternatives having different environmental impacts must be analyzed. At that time, the analysis in the EA, the 2007 supplement, and this supplement would be reviewed and further supplemented pursuant to the NEPA. Review of the EA, the 2007 supplement, and this supplement will be conducted each year to ensure that the EA is sufficient. This process ensures the EA is complete and still appropriate to the scope of bird damage management activities conducted by WS in Vermont.

Site Specificity

The EA, the 2007 supplement to the EA, and this supplement analyze the potential impacts of bird damage management and addresses those activities currently being conducted by WS in the State under a MOU or cooperative service agreement with WS. The EA, the 2007 supplement, and this supplement also addresses the impacts of bird damage management in areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional bird damage management efforts could occur at additional locations within the State. Thus, the EA, the 2007 supplement, and this supplement anticipate the potential expansion and analyze the impacts of such efforts as part of the program. Known cormorant nesting sites where cormorant damage management activities could be conducted on Lake Champlain under the proposed action as supplemented by this assessment are shown in Appendix A.

Planning for the management of wildlife damage must be viewed as being conceptually similar to federal or other agency actions whose missions are to stop or prevent adverse consequences from anticipated future events for which the actual sites and locations where they will occur are unknown but could be anywhere in a defined geographic area. Examples of such agencies and programs include fire and police departments, emergency clean-up organizations, and insurance companies. Although some of the sites where bird damage will occur can be predicted, all specific locations or times where such damage will occur in any given year cannot be predicted. This EA emphasizes major issues as they relate to specific areas whenever possible; however, many issues apply wherever bird damage and resulting management occurs, and are treated as such. The standard WS Decision Model (Slate et al. 1992, USDA 1997) would be the site-specific procedure for individual actions conducted by WS in the State.

The analyses in the EA, the 2007 supplement, and those activities addressed in this supplement are intended to apply to any action that may occur at any place and at any time within the State. In this way, WS believes it meets the intent of the NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with the NEPA and still be able to accomplish its mission.

Issuance of Depredation Permits by the USFWS to Take Birds in the State

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

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

The USFWS is a cooperating agency during the development of this supplement to the EA to analyze cumulative take of those bird species addressed in the EA and this supplement from the issuance of depredation permits to entities within the State. The USFWS has jurisdiction over the management of migratory birds and has specialized expertise in identifying and quantifying potential adverse affects to the human environment from bird damage management activities. The analyses in this proposed supplement to the EA and the analyses in the EA, as supplemented in 2007, will ensure the USFWS compliance with the NEPA for the issuance of depredation permits for the take of those birds species addressed in the EA and the supplement to the EA.

Public Involvement

The EA was made available to the public for review and comment during a 30-day public comment period by a legal notice published in the *Burlington Free Press* on April 20, 2004 and April 21, 2004. A letter of availability for the pre-decisional EA was also mailed directly to agencies, organizations, and individuals with probable interest in the proposed program. One comment letter was received during the public involvement process. Comments from the public involvement process were reviewed for substantive issues and alternatives which were considered in developing the Decision for the EA. Based upon those comments, several minor editorial changes were incorporated into the EA. Those minor changes enhanced the understanding of the proposed program, but did not change the analysis provided in the EA.

After consideration of the analysis contained in the EA and review of public comments, a Decision and Finding of No Significant Impact (FONSI) for the EA was issued on June 14, 2004. The Decision and FONSI selected the proposed action which implemented an integrated damage management program in Vermont using multiple methods to adequately address the need to manage damage caused by birds. Responses to specific comments received during the public involvement process were addressed in Appendix A of the Decision issued in 2004.

A supplement to the EA was developed in 2007 to evaluate proposed disease surveillance activities in birds, to evaluate a need for increased gull damage management activities to restore vegetation and wildlife diversity on islands in Vermont under the Lake Champlain Islands Wildlife Management Area Long-Range Management Plan developed by the VFWD, and to evaluate additional data and research findings available since the 2004 Decision and FONSI. The supplement to the EA was also made

available to the public for review and comment during a 30-day public comment period through the publication of a legal notice in the *Burlington Free Press* that was published on March 12, 2007 and March 13, 2007. A notice of availability was also posted on the APHIS website at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml announcing a 30-day comment period. A letter of availability seeking public comment on the supplement to the EA was also mailed directly to agencies, organizations, and individuals with probable interest in the proposed program. No comments were received from the public during the comment period. After consideration of the analyses in the supplement to the EA, a new Decision and FONSI were signed on April 19, 2007.

This supplement to the EA, along with the EA, the 2007 supplement to the EA, and the associated Decision/FONSI will be made available for public review and comment through the publication of a legal notice announcing a minimum of a 30-day comment period. The legal notice will be published at a minimum in the *Times Argus* and posted on the APHIS website located at http://www.aphis.usda.gov/wildlife_damage/nepa.shtml according to WS' public notification requirements (72 FR 13237-13238). A notice of availability for this supplement to the EA will also be directly mailed to agencies, organizations, and individuals with probable interest in the proposed program. Comments received during the public involvement process will be fully considered for new substantive issues and alternatives before issuing a decision on the supplement to the EA.

VIII. AFFECTED ENVIRONMENT

Upon receiving a request for assistance, the activities described in the alternatives could be conducted on private, federal, State, tribal, and municipal lands in Vermont to reduce damages and threats associated with birds where a request for assistance is received. The analyses in the EA, the 2007 supplement, and this supplement are intended to apply to actions taken under the selected alternative that could occur in any locale and at any time within the analysis area. The EA, as supplement, and this additional supplement analyzes the potential impacts of bird damage management in the State and addresses those activities currently being conducted in areas that are currently under a MOU or cooperative service agreement with WS. The EA, as supplemented, and this additional supplement also address the impacts of bird damage management in the State where additional agreements may be signed in the future between WS and a cooperating entity.

More specific locations 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 are not necessarily 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.

Airports

Because many bird species are ubiquitous throughout the State, it is possible for those species to be present at nearly any airport or military airbase. WS may be requested to address threats of aircraft strikes from airport authorities at any of the airports or airbases in the State where those bird species addressed in this assessment pose a threat to aircraft and passenger safety.

Federal Property

Many federal properties are controlled access areas with security fencing. Those properties often are unconcerned with the presence of birds until the populations of those species are large enough to negatively impact natural resources on the facility or the aesthetic value of property or landscaping. Examples of those types of fenced federal facilities include, but are not limited to, military bases, research facilities, and federal parks. WS may be requested to assist facilities managers in the management of bird damage at such facilities. 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, as supplemented, would cover such actions if the requesting federal agency determined the analyses and scope of those analyses were appropriate for the actions proposed and the requesting federal agency adopted the EA, as supplemented, through their own Decision based on the analyses. Therefore, actions taken on federal lands have been analyzed in the scope of the EA, as supplemented in 2007, and this additional supplement.

State Property

Activities could be conducted on properties owned and/or managed by the State when requested, such as parks, forestland, historical sites, natural areas, scenic areas, conservations areas, and campgrounds. Bird damage management activities could be requested to occur on state highway right-of-ways and interstate right-of ways.

Municipal Property

Activities under the alternatives could be conducted on city, town, or other local governmental properties when requested by those entities. Those areas could include, but would not be limited to city parks, landfills, woodlots, cemeteries, greenways, treatment facilities, utilities areas, and recreational areas. Similar to other areas, birds can cause damage to natural resources, agricultural resources, property, and threaten human safety in those areas. Areas could also include properties in urban and suburban areas of the State.

Private Property

Requests for assistance to manage bird damage and threats could also occur from private property owners and/or managers of private property. Private property could include areas in private ownership in urban, suburban, and rural areas, which could include agricultural lands, timberlands, pastures, industrial parks, residential complexes, subdivisions, businesses, railroad right-of-ways, and utility right-of-ways.

Disease Surveillance and Monitoring Activities

Upon receiving a request for assistance, bird damage management activities could be conducted on private, federal, State, county, and municipal lands in the State for the purposes of studying, containing, and curtailing disease outbreaks in bird populations. Areas could include, but are not limited to, State, county, municipal and federal natural resource areas, park lands, and historic sites; state and interstate highways and roads; railroads and their right-of-ways; property in or adjacent to subdivisions, businesses, and industrial parks; timberlands, croplands, and pastures; public and private properties in rural/urban/suburban areas where birds are a threat to human safety through the spread of disease. The area of the proposed action would also include airports and military airbases where birds are a threat to human safety and to property; areas where birds negatively impact wildlife, including T&E species; and public property where birds are negatively impacting historic structures, cultural landscapes and natural resources.

IX. ISSUES ANALYZED IN DETAIL

Issues are concerns raised regarding potential environmental problems that might occur from a proposed action. Such issues must be considered in the NEPA decision-making process. Issues relating to the reduction of wildlife damage were raised during the scoping process for WS' programmatic FEIS (USDA 1997) and were considered in the preparation of the EA. Issues related to managing damage and threats associated with birds in Vermont were developed by WS in consultation with the USFWS, the VFWD, and the Vermont Agency of Agriculture, Food, and Markets. Issues relating to the management of cormorants were raised and addressed in the cormorant management FEIS developed by the USFWS (USFWS 2003). In addition, issues regarding the management of resident Canada goose populations were addressed in the resident Canada goose management FEIS developed by the USFWS (USFWS 2005).

The major issues are discussed in detail in Chapter 2 of the EA (USDA 2004). Alternatives developed and identified during the development of the EA to address those issues are discussed in Chapter 3 of the EA (USDA 2004). The potential impacts associated with Alternative 1 (technical assistance only), Alternative 3 (non-lethal methods only), and Alternative 4 (no involvement by WS) on the human environment as those potential impacts relate to the major issues have not changed from those described in the EA and thus do not require additional analyses in this supplement. Chapter 4 of the EA contains a detailed discussion and comparison of the identified alternatives and the major issues (USDA 2004). The issues were identified as important to the scope of the analysis in the EA (40 CFR 1508.25). Alternative 2 (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 to reduce damage to agricultural resources, property, natural resources, and threats to human safety. 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 the proposed supplement to the EA as related to Alternative 2 (proposed action/no action alternative):

Issue 1 - Effects on target bird species

The issue of the effects on target bird species arises from the use of non-lethal and lethal methods identified in the EA to address the need for reducing damage and threats associated with those bird species addressed in the EA. Methods employed in an integrated approach to reduce damage and threats are categorized into non-lethal and lethal methods. Non-lethal methods are employed to exclude, harass, and/or disperse wildlife from areas where damage or threats are occurring. Lethal methods are often employed to reinforce non-lethal methods and to remove birds that have been identified as causing damage or posing a threat to human safety. Both non-lethal and lethal methods have the potential to impact bird populations. The EA evaluated those potential impacts and found that when WS' activities are conducted within the scope analyzed in the EA, those activities would not adversely impact bird populations in Vermont (USDA 2004). The EA was supplemented in 2007 to address an increasing need to manage damage associated with gulls, primarily on Lake Champlain, as part of the long-range management plan for islands on the Lake (USDA 2007). Based on the analyses in the 2007 supplement, WS determined that the proposed activities to address increasing requests for assistance with gulls would not adversely affect those gull populations in the northeastern United States (USDA 2007). WS' mitigation measures and Standard Operating Procedures (SOP) are designed to reduce the effects on bird populations and are discussed in section 3.4 of the EA (USDA 2004).

Of primary concern is the magnitude of take on a species' population from the use of lethal methods. Lethal methods are employed to remove an individual or those individuals responsible for causing damage. Lethal methods would only be employed after requests for such assistance are received by WS. The use of lethal methods would therefore result in local population reductions in the area where damage or threats were occurring. The number of target species removed from the population using lethal

methods under the proposed action would be dependent on the number of requests for assistance received, the number of individuals involved with the associated damage or threat, and the efficacy of methods employed.

The analysis for magnitude of impact generally follows the process described in Chapter 4 of WS' programmatic FEIS (USDA 1997). Magnitude is described in WS' programmatic FEIS as "*...a measure of the number of animals killed in relation to their abundance*." Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management involving species whose population densities are high and only after they have caused damage.

Population Impact Analysis of the Proposed Supplement to the EA

To further analyze WS' bird damage management activities in the State and to clearly communicate to the public the potential individual and cumulative impacts of those activities, WS has prepared this supplement to the EA to address an increasing need to manage damage caused by cormorants. This supplement will further address WS' proposed increased take of double-crested cormorants in the State as part of an integrated approach to address increasing requests for assistance.

Double-crested cormorants are large fish-eating colonial waterbirds widely distributed across North America (Hatch and Weseloh 1999). The current range of cormorants appears to be expanding in North America (Hatch 1995) especially in the northern and eastern portions of their breeding ranges and along their winter range (Hatch and Weseloh 1999). In Vermont, cormorants can be found during the summer breeding season and during the spring and fall migration periods (Hatch and Weseloh 1999).

The take of migratory birds, including double-crested cormorants, is prohibited by the MBTA. However, the take of those migratory birds afforded protection under the MBTA can occur pursuant to the Act through the issuance of depredation permit or the establishment of a depredation order by the USFWS. In Vermont, a depredation permit from the VFWD to take migratory birds is also required. Therefore, cormorants are taken in accordance with applicable State and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the take of cormorants pursuant to the PRDO (50 CFR 21.48), and the USFWS and the VFWD processes for issuing depredation permits. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on the take of cormorants as needed to assure cumulative take does not adversely affect the continued viability of populations. The oversight of bird management by the USFWS and the VFWD assures that cumulative impacts on double-crested cormorant populations would not adversely affect the quality of the human environment.

The purpose of the PRDO is to reduce the actual occurrence, and/or minimize the risk, of adverse impacts of cormorants to public resources. Public resources, as defined by the PRDO, are natural resources managed and conserved by public agencies. Public resources include fish (free-swimming fish and stocked fish at federal, State, and tribal hatcheries that are intended for release in public waters), wildlife, plants, and their habitats. The Order authorizes WS, state fish and wildlife agencies, and federally-recognized Tribes to conduct damage management activities involving cormorants without the need for a depredation permit from the USFWS in 24 states, including Vermont. It authorizes the take of cormorants on "all lands and freshwaters" including public and private lands. However, landowner/manager permission must be obtained before cormorant damage management activities may be conducted at any site.

Nationwide, the USFWS predicted that the implementation of the AQDO (50 CFR 21.47), the PRDO, and the issuance of depredation permits would affect approximately 8% of the continental cormorant population on an annual basis (USFWS 2003). The FEIS also predicted the number of cormorants taken by authorized entities under the preferred alternative would increase by 4,140 cormorants per State, including Vermont, above the take that had occurred prior to the development of the EIS (USFWS 2003). Furthermore, the USFWS predicted that authorized take of cormorants and their eggs for the management of double-crested cormorant damage, including those taken in Vermont, is anticipated to have no significant impact on regional or continental double-crested cormorant populations (USFWS 2003). This includes cormorants that may be killed in Vermont under the PRDO by WS, the VFWD, Native American Tribes, and those taken under USFWS and VFWD issued depredation permits.

In addition to the lethal take of cormorants, nest destruction activities could also be conducted to alleviate damage and to disperse nesting cormorants from areas where nesting is adversely affecting natural resources, property, or posing a threat to human safety. Cormorants are a long-lived bird species and the destruction of nests is anticipated to have minimal effects on regional or continental cormorant populations (USFWS 2003).

Double-crested Cormorant Population Impact Analysis

Based on the number of requests received during the development of the EA, the EA evaluated an annual take of up to 800 cormorants and up to 1,000 cormorant nests to alleviate damage (USDA 2004). As stated previously, the need for action associated with this supplement arises from an increase in the number of requests received by WS to manage damage and threats associated with cormorants within the State. As the number of requests for assistance increases, the number of cormorants that will be addressed by WS to alleviate damage or threats is also likely to increase. Based on the number of requests received by WS for assistance with managing damage and threats associated with cormorants in the State and in anticipation of additional requests for assistance, WS could lethally take up to 4,140 double-crested cormorants annually in Vermont to alleviate damage and threats under the proposed supplement to the EA pursuant to the PRDO. Take under the PRDO of up to 4,140 cormorants would be in addition to the take that could occur pursuant to depredation permits issued for the take of cormorants to alleviate damage or threats not directly addressed in the PRDO. Under the proposed supplement to the EA, up to 2,000 cormorants could be taken under depredation permits issued by the USFWS annually in the State by WS. In addition, up to 1,000 nests could be destroyed by WS annually to disperse nesting cormorants from areas to reduce nest site competition and to reduce habitat damage. Although the increased take of cormorants and their nests could occur where requested in the State, the primary increase in requests for assistance are to meet the objectives outlined in the Lake Champlain Islands management plan. As the number of cormorants using the Lake (both nesting and feeding) increases, the number of cormorants addressed by WS and other entities to achieve those objectives is also likely to increase.

The number of cormorants observed during the BBS conducted in the northeastern United States (USFWS Region 5) has increased 1.6% annually since 1966 (Sauer et al. 2008). Across the United States, the number of cormorants observed during the BBS has increased annually at an estimated rate of 5.1% since 1966, which is a statistically significant increase (Sauer et al. 2008). Despite known breeding colonies in Vermont, no BBS data is currently available for Vermont (Sauer et al. 2008). The lack of data from the BBS conducted in Vermont is likely a result of the methods of counting birds used during the survey. Observers conducting counts for the BBS are restricted to points along established routes along roadways and can only count those birds observed or heard within a quarter of a mile from those survey points. Since most nesting colonies of cormorants occur on islands in Vermont, observing those cormorants can be difficult especially when given the constraints associated with the BBS. Colonial

waterbird surveys are often conducted in known nesting areas to estimate changes in breeding populations.

In 1999, Young Island had the largest cormorant colony on Lake Champlain with 3,053 nests. Today, the largest cormorant colony on the Lake occurs on Four Brothers Islands located on the New York side of the Lake, where 3,996 nests were counted in 2009 (D. Capen, University of Vermont pers. comm. 2009). The Four Brothers Islands are located approximately 4.8 miles from Shelburne Bay at the southern end of Burlington, Vermont and approximately 21.6 miles south of Young Island. Other breeding colonies on Lake Champlain include colonies at Missisqoui National Wildlife Refuge and Crown Point. From 1999 to 2009, the average number of nesting pairs observed on Lake Champlain has been 4,098 pairs of cormorants (D. Capen, University of Vermont pers. comm. 2009). During the same period, the estimated average number of nesting pairs on Young Island and Four Brothers Islands was 1,134 and 2,603, respectively (D. Capen, University of Vermont, unpublished data).

To alleviated damage and threats associated with cormorants, the USFWS can issue depredation permits for the lethal take of cormorants when warranted. Depredation permits issued by the USFWS from 2005 through 2009 to lethally take cormorants are listed in Table 1. In addition to the lethal take through the issuance of a depredation permit, take can also occur under the PRDO in Vermont by WS, State agencies, and Native American Tribes without the need for a depredation permit when cormorants are causing damage to public resources. The cormorants lethally taken, including the destruction of nests, under depredation permits and under the PRDO in the State of Vermont are also shown in Table 1.

Table 1 – Double-crested cormorants addressed by all entities from 2005 to 2009 in Vermont

Year	No. of Permits	Authorized Take	Reported Take	PRDO Take	Nests Destroyed (Permit)	Nests Destroyed (PRDO)
2005	1	125	0	458	0	1,102
2006	1	125	0	328	0	610
2007	2*	300	196	222	0	529
2008	1	125	122	503	9	0
2009	2	225	125	1,001	137	103

* In 2007, a scientific collecting permit was issued by the USFWS to allow the take of 175 cormorants for scientific purposes.

WS' take of cormorants in the State to alleviate damage and threats of damage under depredation permits and the PRDO from FY 2005 through FY 2009 are shown in Table 2. WS' highest level of take occurred in FY 2009 when 606 cormorants were lethally taken under the PRDO and 125 cormorants were lethally taken under depredation permits in the State. In addition, WS dispersed 28,951 cormorants in the State to alleviate damage in FY 2009. WS' take of cormorants from FY 2005 through FY 2009 has primarily occurred pursuant to the PRDO to alleviate damage occurring to natural resources on Lake Champlain.

Table 2 – Double-crested cormorants addressed by WS in Vermont from FY 2005 to FY 2009

Fiscal Year	Dispersed	WS' Take	
		PRDO	Depredation Permit
2005	0	458	0
2006	0	328	0
2007	25	222	196*
2008	0	440	122
2009	28,951	606	125
TOTAL	**28,976**	**2,054**	**443**

* 175 cormorants were collected by the National Wildlife Resource Center through the issuance of a scientific collection permit by the USFWS

As presented in Table 2, from FY 2005 through FY 2009, the WS program in Vermont has killed 2,497 cormorants at all project sites in Vermont under the PRDO and under depredation permits issued by the USFWS and the VFWD. During the same time frame, non-WS entities reported killing no cormorants in Vermont under USFWS or VFWD issued depredation permits. In the last three years, the WS program in Vermont has destroyed/oiled 778 cormorant nests at all project sites in Vermont under the PRDO and under depredation permits issued by the USFWS and the VFWD. During this time frame, non-WS entities reported destroying no cormorant nests in Vermont under depredation permits.

A total of 610 nests in 2006 and 529 nests in 2007 were destroyed on Young Island. In addition, 244 cormorants were lethally removed in 2006 and 212 cormorants were lethally taken in 2007 from the Island. Cormorant nest oiling activities on Young Island conducted in 2006 represented 14% of the total nests on Lake Champlain which was estimated at 4,245 nests. In 2007, the number of nests removed from the Island represented 13% of the 4,137 nests on the Lake. The number of cormorant nests destroyed on Young Island and Four Brothers Islands in an effort to restore vegetation on the Islands and to increase species diversity since 2000 is shown in Table 3.

The NYSDEC and the WS program in New York also conduct cormorant damage management activities on Lake Champlain on those portions of the Lake that are part of the State of New York. The NYSDEC is currently monitoring two properties (Crown Point and Valcour Island) that are owned by the State of New York. The NYSDEC and WS have previously employed lethal and non-lethal methods to disperse cormorants from those locations to reduce nest site competition between cormorants and other nesting colonial waterbirds. In addition, activities have been conducted by the NYSDEC and WS to discourage cormorants from nesting at those locations to reduce damage to vegetation on those islands. In FY 2008, the NYSDEC and WS began oiling eggs in nests on four private islands (Four Brothers Islands) as part of research efforts to determine the effectiveness of nest oiling in dispersing cormorants from nesting locations. A total of 2,221 nests were oiled in 2008 and 2,276 nests were oiled in 2009 as part of the research efforts. In addition, 479 cormorants were lethally taken on the Lake under the PRDO by the NYSDEC and the WS program in New York in 2009.

Table 3 - The number of cormorant nests and the number of nests oiled on Young Island and Four Brothers on Lake Champlain from 2000 through 2009

	Location			
	Four Brothers Islands		Young Island	
Year	Total Nests	Nests Oiled	Total Nests	Nests Oiled
2000	1,346	0	1,741	1,741
2001	2,437	0	1,294	776
2002	2,498	0	1,325	840
2003	2,779	0	1,263	748
2004	2,340	0	1,458	1,458
2005	2,971	0	1,102	1,102
2006	3,499	0	610	610
2007	3,440	0	529	529
2008	3,833	2,221	0	0
2009	3,996	2,276	103	103

As was stated previously, a total of 8,622 adult cormorants are estimated to be present on the Lake during the breeding season. When the non-breeding population on the Lake is included with breeding adults, the number of cormorants present on the Lake during the breeding season could be estimated between 11,200 and 25,866 cormorants. The numbers of cormorants present elsewhere in the State during the breeding

season is unknown. However, those cormorants located on the Lake during the breeding seasons likely constitute a large majority of the number of cormorants present in the State during the breeding season.

Waterbird colony surveys were recently completed in the Great Lakes region which included all five Great Lakes and their connecting channels, Lake Champlain, Oneida Lake in New York, and the St. Lawrence River up to and including Lac St. Pierre (Weseloh et al. 2006). Surveys conducted in the Great Lakes region during 2005 counted 115,000 cormorant nests at 216 sites (Weseloh et al. 2006). Surveys of waterbird colonies also occurred in 2007 and 2009 in the Great Lakes region. In 2007, 110,400 cormorant nests were counted with 102,500 nests recorded during the 2009 survey (F. Cuthbert, University of Minnesota, unpublished data). The decline in the number of nests surveyed could be a result of the lethal take of cormorants and nest destruction activities or could be a result of variability in detection rates (USFWS 2009*a*). Like other surveys, the colonial waterbird surveys often only account for the number of breeding pairs which is based on the number of nests counted using the formula of two adults per nest. The Great Lakes surveys only accounted for nesting cormorants and did not estimate the number of non-breeding cormorants present in the region during the survey. Using the range of non-breeding cormorants per breeding pair cited in Tyson et al. (1999) of 0.6 to 4.0 cormorants, the Great Lakes region population of cormorants could be estimated to range from 266,500 to 615,000 cormorants based on the number of nests counted during the 2009 survey. The USFWS (2009*a*) estimated the Great Lake cormorant population at 345,078 cormorants.

To alleviate damage and threats of damage, cormorants and their nests can be taken under the PRDO, the AQDO, and under depredation permits issued by the USFWS. However, cormorants can only be taken under the PRDO and under depredation permits in Vermont. Vermont was not included on the list of States eligible to implement the AQDO. The take of cormorants from 2004 through 2008 under the depredation orders and under depredation permits in the 24 States included in the PRDO are shown in Table 4. Between 2004 and 2008, an average of 40,403 cormorants have been taken under the two depredation orders and under depredation permits issued by the USFWS, including those cormorants lethally taken in Vermont. The USFWS (2009*a*) estimated the take of cormorants under the depredation orders and depredation permits involved primarily those cormorants that are considered a part of the Interior cormorant population. Those cormorants found in Vermont are considered part of the Interior population of cormorants (Tyson et al. 1999).

Table 4 – Double-crested cormorant take in the 24 States included in the PRDO*

Year	Take by Depredation Order or Permit		Total Take
	PRDO	AQDO and Permits	
2004	2,334	28,651	**30,985**
2005	11,221	25,009	**36,230**
2006	21,428	33,393	**54,821**
2007	19,960	19,405	**39,365**
2008	18,745	21,868	**40,613**

*Adapted from USFWS 2009*a*

The cormorant management FEIS developed by the USFWS estimated the number of cormorants lethally taken under an alternative implementing a PRDO, an AQDO, and allowing take through the issuance of depredation permits would increase to 159,635 cormorants annually (USFWS 2003). The FEIS determined the lethal take of up to 159,635 cormorants annually under the depredation orders and under depredation permits would impact approximately 8% of the continental cormorant population. As shown in Table 4, the annual take of cormorants from 2004 through 2008 has not exceeded 159,635 cormorants in any given year. The highest level of cormorant take occurred in 2006 when 54,821 cormorants were lethally taken which represents 34.3% of the 159,635 cormorants evaluated in the cormorant management

FEIS. The FEIS determined an annual take of 159,635 cormorants annually would be sustainable at the State, regional, and national level (USFWS 2003). The take that has occurred since the implementation of the preferred alternative in the FEIS which implemented the PRDO and modified the existing AQDO, has only reached a high of 34.3% of the level evaluated in the FEIS which determined the higher level of take would not significantly impact cormorant populations. Upon further evaluation, the USFWS determined the implementation of the preferred alternative in the FEIS that has allowed the annual take level of cormorants under the PRDO, the AQDO, and under depredation permits has not reached a level where undesired adverse affects to cormorant population would occur (USFWS 2009*a*). The USFWS subsequently extended the expiration dates of the PRDO and the current AQDO for another five years (USFWS 2009*a*).

In addition, the USFWS determined the destruction of nests allowed under the PRDO, the AQDO, and under permits would not reach a level where an undesired adverse affect on cormorant populations would occur (USFWS 2003). The USFWS further evaluated nest destruction activities from 2004 through 2008 and determined the number of nests destroyed since 2004 and the continued destruction of nests evaluated in the FEIS would not reach a magnitude that would cause undesired declines in cormorant populations (USFWS 2009*a*).

Seamans et al. (2008) used bird band recovery models to estimate temporal trends in hatch-year, second-year, and after second-year survival of cormorants banded in the Great Lakes region from 1979 through 2006. The period of time evaluated encompassed the period of rapid cormorant population increase in the Great Lakes, the establishment of the AQDO in 1998 by the USFWS, and the establishment of the PRDO and changes to the AQDO implemented in 2003 by the USFWS. Survival in hatch-year birds decreased throughout the study period and was negatively correlated with abundance estimates for cormorants in the Great Lakes area. The decline may have been related to density-dependent factors. However, there was also evidence that the depredation orders were contributing to the decreasing survival in hatch-year birds. The data was unclear on whether the depredation orders were reducing the survival of second-year or after-second year cormorants even though lethal removal of cormorants in the Great Lakes increased after the implementation of the depredation orders. Seamans et al. (2008) found that the survival rates of second-year and after second-year cormorants did decrease from 2004 through 2006 based on banding data, but survival rates for those two age classes were still within the range observed for previous years. Additional time may be required before the models used by Seamans et al. (2008) detect any changes in mortality rates resulting from the establishment of the PRDO and the modification of the AQDO that occurred in the 2003 due to the lag effect.

Blackwell et al. (2000) examined the relationship between the number of fish-eating birds reported killed under depredation permits issued by the USFWS to aquaculture facilities in New York, New Jersey, and Pennsylvania and population trends of those bird species lethally taken within those respective States. Blackwell et al. (2000) found that the USFWS issued 26 depredation permits to nine facilities from 1985 through 1997 allowing the lethal take of eight species of fish-eating birds but only six species were reported killed to reduce aquaculture damage. Those species lethally taken under those permits included black-crowned night herons, double-crested cormorants, great blue herons, herring gulls, ring-billed gulls, and mallards. The number of birds reported killed, relative to systematic long-term population trends, was considered to have had negligible effects on the population status of those species (Blackwell et al. 2000).

As stated earlier, WS anticipates the annual take of cormorants in the State under the PRDO to reach 4,140 cormorants which is the level evaluated in the FEIS developed by the USFWS for each State allowed to implement the PRDO. In addition, up to 2,000 cormorants could be lethally taken annually by WS under depredation permits issued by the USFWS. When combined, WS' total annual take could increase to 6,140 cormorants in the State to alleviate damage and threats. No take of cormorants has

occurred by other entities in the State from 2005 through 2009. Take by other entities could occur under the PRDO or under depredation permits issued by the USFWS and the VFWD. However, take by other entities is not likely to reach a magnitude that would elevate the cumulative take of cormorants in the State to a level where adverse affects are likely to occur.

If 6,140 cormorants were lethally taken by WS annually in the State, the take would represent 3.9% of the estimated 159,635 cormorants that was evaluated in the cormorant management FEIS which determined an annual take of up to 159,635 would not significantly impact continental cormorant populations. As shown in Table 4, the highest level of cormorant take by all entities under the PRDO, the AQDO, and under depredation permits occurred in 2006 when 54,821 cormorants were lethally taken. If WS had lethally taken 6,140 cormorants in 2006, the total cormorant take would have been 60,961 cormorants which would have represented 38.2% of the estimated 159,635 cormorants that were evaluated in the cormorant management FEIS. Therefore, based on the evaluations of the USFWS, the proposed take by WS would not cumulatively affect cormorant populations.

The USFWS, as the agency with migratory bird management responsibility, will impose restrictions on cormorant damage management at the State, regional, and national levels as needed to assure cumulative take does not adversely affect the long-term sustainability of populations. WS will continue to submit to the USFWS annual work plans in accordance with the PRDO which ensures WS' activities are considered as part of population objectives for cormorants in Vermont.

Issue 2 - Effects on Other Wildlife Species, Including Threatened and Endangered Species

The issue of non-target species effects, including effects on threatened and endangered species arises from the use of non-lethal and lethal methods identified in the alternatives. The use of non-lethal and lethal methods has the potential to inadvertently disperse, capture, or kill non-target wildlife. WS' minimization measures and Standard Operating Procedures are designed to reduce the effects of damage management activities on non-target species' populations which were discussed in WS' programmatic FEIS (USDA 1997) and the EA (USDA 2004). To reduce the risks of adverse affects to non-target wildlife, WS selects damage management methods that are as target-selective as possible or applies such methods in ways that reduces the likelihood of capturing non-target species. Before initiating management activities, WS also selects locations which are extensively used by the target species and employs baits or lures which are preferred by those species. Despite WS' best efforts to minimize non-target take during program activities, the potential for adverse affects to non-targets exists when applying both non-lethal and lethal methods to manage damage or reduce threats to safety.

Non-lethal methods have the potential to cause adverse effects on non-targets primarily through exclusion, harassment, and dispersal. Any exclusionary device erected to prevent access of target species also potentially excludes species that are not the primary reason the exclusion was erected. Therefore, non-target species excluded from areas may potentially be adversely impacted if the area excluded is large enough. The use of auditory and visual dispersal methods used to reduce damage or threats caused by target species are also likely to disperse non-targets in the immediate area where the methods are employed. However, the potential impacts on non-target species are expected to be temporary with target and non-target species often returning after the cessation of dispersal methods.

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

1997).

Non-target Species Analysis from WS' Activities in the State

While every precaution is taken to safeguard against taking non-targets during operational use of methods and techniques for resolving damage and reducing threats caused by wildlife, the use of such methods can result in the incidental take of unintended species. Those occurrences are minimal and should not affect the overall populations of any species. Since FY 2004, no non-target species were lethally taken during WS' bird damage management activities in Vermont (USDA 2007). WS' take of non-target species during activities to reduce damage or threats to human safety caused by birds is expected to continue to be extremely low to non-existent. WS will continue to annually monitor the take of non-target species to ensure program activities or methodologies used in damage management activities do not adversely impact non-targets.

The EA concluded that WS' damage management activities would have no adverse effects on other wildlife species (non-target), including threatened and endangered species throughout the State when those activities were conducted within the scope analyzed in the EA. Methods used by WS are selective for target species when applied appropriately. In addition, WS adheres to those minimization measures and procedures discussed in the EA to minimize the potential for non-target take.

Non-target Species Analysis under the Proposed Supplement to the EA

The supplement to the EA evaluates those activities conducted by WS pursuant to the proposed action in the EA, as supplemented in 2007, to resolve an increasing number of requests to manage damage or threats of damage to resources associated with cormorants. WS' response to an increasing number of requests for direct operational assistance will result in the increased use of methods to resolve those requests. The number of methods employed to resolve the increasing requests for assistance could also increase under the proposed supplement to the EA. In addition, the frequency of individual method application to resolve requests for assistance is also likely to increase.

Shooting and capture with nets have been the primary methods employed by WS to alleviate damage associated with cormorants (USDA 2007). Shooting is essentially effective for target species since identification of the target occurs prior to the application of the method. Nets allow for any non-target captured to be released on site. Therefore, any increase in the use of firearms or nets to resolve damage and threats associated with those activities described in the proposed supplement to the EA would not result in adverse affects to non-targets since no lethal take of non-targets has occurred previously or is expected to occur from the use of those methods. Euthanasia methods approved by the American Veterinary Medical Association (AVMA) for free-ranging birds which are employed by WS are selective for target species (AVMA 2007).

Under the proposed action described in the EA, WS incorporates lethal and non-lethal methods to resolve damage and threats of damage. As described previously, WS has primarily employed pyrotechnics and the noise associated with the discharge of a firearm to disperse birds from areas where damage has occurred or could occur. Under the proposed supplement to the EA, the frequency of pyrotechnic use could increase as WS addresses an increase in the number of requests for assistance. Non-target species are usually not affected by WS' non-lethal management activities, except for the occasional scaring from harassment devices. In those cases, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity but would most likely return after conclusion of the action. Because non-lethal methods are intended to disperse wildlife unharmed from areas where those methods are applied, an increase in the use of those methods to disperse birds will not adversely affect non-target wildlife. The increase in use of those methods would not reach a magnitude that would adversely affect

non-target wildlife populations.

Threatened and Endangered Species Analysis

A review of threatened and endangered (T&E) species listed by the USFWS and the VFWD showed that additional listings of T&E species have occurred since the completion of the EA. Since the Decision/FONSI was signed for the EA in 2004, three additional species have been federally-listed in Vermont to include the Eskimo curlew (*Numenius borealis*), American burying beetle (*Nicrophorus americanus*), and the small whorled pogonia (*Isotria medeoloides*). The Eskimo curlew, the American burying beetle, and the small whorled pogonia are listed in Vermont, but are not known to currently occur in the State. Based on the absence of those species from the State, WS has determined that bird damage management activities described in the EA, as supplemented in 2007, and this proposed supplement to the EA will have no effect on those species. The New England cottontail (*Sylvilagus transitionalis*) is currently considered a candidate species for federal listing in Vermont. Although once endemic to Vermont, the New England cottontail is now thought to be extirpated from the State with no documented sightings in the State since 1971 (see citations and information in USFWS 2009*b*). Based on the likely extirpation of the species from the State, WS' activities addressed in the EA, as supplemented in 2007, and proposed under this supplement to the EA will have no effect on the New England cottontail.

WS' program activities in Vermont to manage damage caused by birds have not changed from those described in the EA except for those aspects addressed in the supplement to the EA developed in 2007 and those activities proposed in this supplement to the EA. Thus, the determination in the EA made by WS for those species listed during the development of the EA is still appropriate (USDA 2004). WS has reviewed those activities addressed in the supplement to the EA and has determined those activities will have no effect on T&E species listed in the State. For those species listed and proposed for listing in Vermont since the completion of the EA, WS has determined that the proposed action in the EA and the proposed supplement to the EA will have no effect on those species. Program activities and their potential impacts on other wildlife species, including T&E species have not changed from those analyzed in the EA. Impacts of the program on this issue are expected to remain insignificant.

Issue 3 - Effects on Human Health and Safety

Based on the analyses in the EA and WS' programmatic FEIS, when WS' activities are conducted according to WS' directives and standard operating procedures; federal, state, and local laws; and label requirements, those activities pose minimal risks to human safety (USDA 1997, USDA 2004, USDA 2007). The analyses in the EA also concluded that WS' activities to reduce threats and hazards associated with birds were likely to have positive impacts to human health and safety by addressing safety issues and disease transmission associated with those birds. Positive benefits would include reducing threats associated with work place safety caused by accumulations of bird feces under bird roosts in areas where people work and are likely to encounter feces or surfaces contaminated with bird feces. Other positive impacts include reducing potential bird strikes at airports. Bird strikes with aircraft can lead to extensive damage to aircraft and can threaten passenger safety.

Human Safety Analysis from WS' Activities in the State

Management activities conducted by WS from FY 2004 through FY 2009 did not result in any injuries or illness to any members of the public or to WS' personnel. No injuries or illness from WS' activities were reported to WS from FY 2004 through FY 2009. WS' program activities had a positive impact 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 Vermont.

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 cormorants which could result in methods being employed 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 will continue to incorporate those minimization measures described in Chapter 3 in the EA into the bird damage management activities which will minimize the risks to human safety. Based on the use patterns of the methods available, an increase in the use of those methods to address the activities described in the supplement to the EA pertaining to an increase in activities involving cormorants will not increase risks to human safety. WS' employees are trained in the proper use of methods to ensure the safety of the employee and the public. No adverse affects to human safety have occurred or have been reported to occur from WS' activities conducted from FY 2004 through FY 2009. An increase in the number of methods used or an increase in the frequency that a method is used will not increase risks to human safety when consideration of human safety is part of the use pattern associated with those methods.

Issue 4 - Impacts to stakeholders, including aesthetics

As described in the EA, WS would employ methods when requested that would result in the dispersal, exclusion, or removal of individuals or small groups of target bird species to resolve damage and threats. In some instances where birds are dispersed or removed, the ability of interested persons to observe and enjoy those birds will likely temporarily decline.

Even the use of exclusionary devices can lead to dispersal of birds if the resource being damaged was acting as an attractant. Thus, once the attractant has been removed or made unavailable, birds will likely disperse to other areas where resources are more vulnerable making them unavailable for viewing or enjoyment at the location where damage was occurring.

Impacts to Stakeholders Analysis from WS' Activities in the State

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 Vermont only conducts activities at the request of the affected property owner or resource manager. Upon receiving a request for assistance, WS addresses issues/concerns and explanations are given for the reasons why a particular method or group of methods would be the most effective in reducing damage for the specific situation. Methods employed to reduce or resolve damage is agreed upon by the cooperator according to a cooperative service agreement.

Information in the summary report and supplement to the EA developed in 2007 indicated that WS' take of bird species has been minimal and of a low magnitude when compared to the populations of those species. WS' take has not reached a magnitude of take that would severely limit the ability to view and enjoy birds. Only those birds identified as causing damage were targeted by WS during damage management activities and only after a request for such action was received. WS addressed most birds using non-lethal harassment methods to alleviate damage and threats which disperses birds from those areas (USDA 2007). Similarly, the use of lethal methods removes those birds associated with the damage. However, birds can be viewed outside the area where damage management activities were conducted if a reasonable effort is made to locate those 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 Vermont. Therefore, activities are not conducted over large areas that would greatly limit the aesthetic value of birds.

Impacts to Stakeholders Analysis under the Proposed Supplement to the EA

The increased take of cormorants addressed in the supplement to the EA would result in a greater number of cormorants being lethally taken at a location or would result in an increase in the number of locations where cormorants are lethally removed. The use of lethal methods would result in temporary declines in local populations resulting from the removal of cormorants to resolve requests for assistance. WS' goal is to respond to requests for assistance and to manage those birds responsible for the resulting damage. Therefore, the ability to view and enjoy cormorants in Vermont will still remain if a reasonable effort is made to locate cormorants outside the area in which damage management activities occurred.

The ability to view and enjoy the aesthetic value of cormorants at a particular site would be somewhat limited if the cormorants were removed as part of an integrated approach to managing damage. However, new cormorants would most likely use the area in the future, although the length of time until these birds arrive is variable, depending on the site, time of year, and population densities of those birds in the surrounding areas. The opportunity to view cormorants is 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 take of cormorants under the supplement to the EA could be considered low if take levels occurred at the levels proposed. WS' proposed activities addressed in the proposed supplement would not result in the decline of cormorant populations over a large geographical area but would be limited to site specific locations where cormorant damage has occurred or is likely to occur. Therefore, even with the proposed increased take of cormorants under the supplement, the cormorant populations would remain high in the State and the aesthetic value of those species could be enjoyed if a reasonable attempt is made to locate cormorants outside of the damage management area.

Issue 5 - Humaneness and Animal Welfare Concerns of Methods Used

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

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

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

Therefore, WS' mission is to effectively address requests for assistance using methods in the most humane way possible that minimize the stress and pain of the animal. WS' personnel are experienced and professional in their use of management methods, and methods are applied as humanely as possible.

Humaneness Analysis from WS' Activities in the State

Methods used in bird damage management activities in Vermont from FY 2004 through FY 2009 and their potential impacts on humaneness and animal welfare did not changed from those analyzed in the EA (USDA 2004, USDA 2007). All methods employed by WS from FY 2004 through FY 2009 to alleviate bird damage were discussed in the EA (USDA 2004). 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 AVMA. Therefore, the analyses of the humaneness of methods used by WS to manage damage and threats caused by birds from FY 2004 through FY 2009 did not change from those analyzed 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 the use of methods increasing. Those methods considered inhumane by certain segments of society would be considered inhumane no matter the frequency of the use of those methods. Those methods considered inhumane that were addressed in the EA would continue to be considered 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 will continue to employ methods as humanely as possible and would continue to employ euthanasia methods recommended for wild birds by the AVMA.

X. ISSUES ADDRESSED BUT NOT IN DETAIL

In addition to the identified major issues considered in detail, five other issues were considered in Chapter 2 of the EA, but were not analyzed in detail with rationale provided in the EA. WS has reviewed the issues not considered in detail as described in the EA and has determined that the analyses provided in the EA is still appropriate regarding those issues.

XI. ALTERNATIVES ANALYZED IN DETAIL

The alternatives considered and evaluated using the identified issues are described and discussed in detail in Chapter 3 of the EA (USDA 2004). In addition, the EA, as supplemented in 2007, contains a detailed description and discussion of the alternatives and the effects of the alternatives on the issues identified (USDA 2004, USDA 2007). Appendix B of the EA provides a description of the methods that could be used or recommended by WS under each of the alternatives. The EA describes four potential alternatives that were developed to address the issues identified above. Alternatives analyzed in detail include:

Alternative 1 - Technical Assistance Only
Alternative 2 - Integrated Bird Damage Management Program (Proposed Action/No Action)
Alternative 3 - Non-lethal Bird Damage Management Only By WS
Alternative 4 - No federal WS Bird Damage Management

XII. ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Five additional alternatives were considered, but not analyzed in detail in the EA. Alternatives considered but not analyzed in detail are discussed in Chapter 3 of the EA (USDA 2004). WS has

reviewed the alternatives not analyzed in detail in the EA and has determined that the analyses provided in the EA have not changed and are still appropriate.

XIII. MITIGATION AND STANDARD OPERATING PROCEDURES

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for effects that otherwise might result from that action. As appropriate, mitigation measures are incorporated in WS' SOPs. The current WS' program, nationwide and in Vermont, uses many SOPs. SOPs are discussed in Chapter 3 of the EA (USDA 2004) and Chapter 5 of WS' programmatic FEIS (USDA 1997). The SOPs discussed in the EA remain appropriate for WS' wildlife damage management activities conducted in the State.

XIV. WILDLIFE DAMAGE MANAGEMENT METHODS

A description of the wildlife damage management methods that could be used or recommended by WS is provided in Appendix B of the EA (USDA 2004) and in Appendix J of WS' programmatic FEIS (USDA 1997). Since the completion of the EA, an avian reproductive inhibitor with the active ingredient nicarbazin has been registered for use to manage damage associated with pigeons and Canada geese. The formulation for use to manage Canada geese is considered a restricted-use pesticide requiring the appropriate pesticide applicators license to purchase and apply the product. Under Alternative 1 (technical assistance only), WS could recommend the use of nicarbazin to reduce damage associated with pigeons and Canada geese while conducting technical assistance. However, under Alternative 1, WS would not directly employ nicarbazin to manage damage associated with pigeons or Canada geese. Under Alternative 2 (proposed action/no action), WS could employ nicarbazin as part of an integrated approached to managing damage associated with pigeons or Canada geese. WS could also recommend the use of nicarbazin when providing technical assistance under Alternative 2. Under Alternative 3 (non-lethal methods only), WS could also employ nicarbazin to manage damage associated with pigeons and Canada geese since the chemical methods is considered a non-lethal method. In addition, WS could recommend the use of products containing nicarbazin under Alternative 3. Under Alternative 4 (no activities by WS), WS would not be involved with managing damage associated with birds; therefore, would not directly employ or recommend the use of nicarbazin. However, products containing nicarbazin could be employed by those persons experiencing damage that poses the necessary pesticide applicators license despite WS' lack of involvement.

Nicarbazin would be available for use by pesticide applicators under any of the alternatives analyzed in the EA. Similarly, the potential impacts on the identified issues would be similar amongst those issues. The use of nicarbazin is discussed in relationship to the use of the product under the proposed action as related to the five identified issue below.

Nicarbazin

Since the completion of the EA, products with the reproductive inhibitor known as nicarbazin have been registered for use by the Environmental Protection Agency (EPA) to manage Canada goose and rock pigeon populations by reducing the likelihood that eggs laid by geese and pigeons will hatch. Nicarbazin is a complex of two compounds, 4,4'-dinitrocarbanilide (DNC) and 4,6-dimethyl-2-pyrimidinol (HDP) which interferes with the formation of the vitelline membrane that separates the egg yolk and egg white which prevents the development of an embryo inside the egg (EPA 2005). The active component of nicarbazin is the DNC compound with the HDP compound aiding in absorption of DNC into the

bloodstream (EPA 2005). Nicarbazin was first developed to treat coccidiosis[2] outbreaks in broiler chickens and has been approved as a veterinary drug by the Food and Drug Administration (FDA) since 1955 for use in chicken feed to prevent the disease coccidiosis (EPA 2005).

Nicarbazin, as a reproductive inhibitor for geese and pigeons, has been registered with the EPA as a pesticide pursuant to the Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) under the trade names OvoControl® G and OvoControl® P (Innolytics, LLC, Rancho Santa Fe, CA), respectively. OvoControl® G (EPA Reg. No. 80224-5) is a restricted use pesticide for reducing the egg hatch of resident Canada geese, domestic mallard ducks, domestic Muscovy ducks, and domestic waterfowl hybrids in urban areas. The use of OvoControl® G is limited to sites in urban areas, such as office parks, recreational parks, airports, golf courses, schools, hospitals, restaurants, and commercial/industrial sites. The exception is that it may be used at airports in rural areas, if the airport holds FAA certifications under 14 CFR 139.101 and a wildlife hazard management plan under 14 CFR 139.337. OvoControl® G also requires a depredation permit from the USFWS for applications involving resident Canada geese. OvoControl® G was not registered in the State at the time this supplement was developed.

The OvoControl® P (EPA Reg. No. 80224-1) formulation for pigeons contains 0.5% of the active ingredient nicarbazin by volume as a ready-to-use bait for pigeons in urban areas only. Baiting can only occur on rooftops or other flat paved or concrete surfaces such as buildings, office parks, malls, hospitals, bridges, airports, tunnels, and commercial sites.

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

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

One of the difficulties in calculating an actual reduction in a targeted population prior to application of the bait is that consumption of nicarbazin treated bait as currently formulated does not appear to completely eliminate egg hatch in birds. Current studies on nicarbazin as a reproductive inhibitor has shown variability in hatch rates of birds fed treated baits (VerCauteren et al. 2000, Bynum et al. 2005, Yoder et al. 2006). In addition, birds must consume bait treated with nicarbazin daily in the correct dosage throughout the breeding season to achieve the highest level of effectiveness in reducing egg hatch. Pigeons can breed year-around with peak breeding occurring from February through October (Johnston 1992). Resident Canada geese generally nest from February through June each year (USFWS 2005).

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

Giunchi et al. (2007) found that when pigeons were fed treated baits (800 parts per million (ppm)) the number of hatchlings produced declined between 13% and 48% compared to a control group. When pigeons were fed doses of nicarbazin treated bait daily in cage studies at the levels currently found in OvoControl® P (5,000 ppm), Avery et al. (2008) found that the rate of egg hatch was reduced by 59% in captive pigeons. In simulating a 50% reduction in egg hatch, Giunchi et al. (2007) predicted through modeling that a population of 5,000 pigeons would be reduced by half if a 50% reduction in pigeon egg hatch occurred annually over a five-year period. The same population would rebound back to 5,000 individuals within five years if egg hatch returned to normal.

Since the effects of nicarbazin on egg hatch are reversible if no longer provided for consumption (VerCauteren et al. 2000, Bynum et al. 2005, Avery et al. 2006, Yoder et al. 2006, Giunchi et al. 2007, Avery et al. 2008), the reduction in the local pigeon or Canada goose populations from the use of nicarbazin can be maintained at appropriate levels where damages or threats are resolved by increasing or decreasing the amount of nicarbazin treated bait available to target birds. Although localized populations of pigeons and Canada geese would likely be reduced from the use of nicarbazin, the extent of the reduction would be variable given the uncertainty in effectiveness of nicarbazin to reduce egg hatch. When pigeons were provided nicarbazin in cage trials at dosage levels found formulated in OvoControl® P (5,000 ppm), not all eggs laid were infertile with 41% of the eggs producing apparently healthy chicks (Avery et al. 2008). When geese were provided nicarbazin at dosage levels found formulated in OvoControl® G, not all eggs laid were infertile (VerCauteren et al. 2000, Bynum et al. 2005, Yoder et al. 2006).

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

The potential adverse affects to non-target wildlife are also a concern from the use of nicarbazin to manage pigeon and Canada goose populations. Exposure of non-target wildlife to nicarbazin could occur either from direct ingestion of the bait by non-target wildlife or from secondary hazards associated with wildlife consuming birds that have eaten treated bait. Several label restrictions for nicarbazin use are intended to mitigate risks to non-target wildlife from direct consumption of treated bait (EPA 2005). Daily observation of bait sites for target and non-target activity must occur during a five to fourteen day acclimation period. The required acclimation period habituates target birds to feed in one location at a certain time period. During the observation periods, the applicator must be present on site until all bait has been consumed. Non-target risks are further minimized by requirements in the formulation for pigeons that bait only be placed on rooftops in urban areas and if not practical, baiting is limited to paved and/or on hard concrete surfaces. All unconsumed bait must also be retrieved daily which further reduces threats of non-target consuming treated bait.

In addition, nicarbazin is only effective in reducing the hatch of eggs when blood levels of DNC are sufficiently elevated in a bird species. When consumed by birds, nicarbazin is broken down into the two base components of DNC and HDP which are then rapidly excreted. To maintain the high blood levels required to reduce egg hatch, birds must consume nicarbazin daily at a sufficient dosage that appears to be variable depending on the bird species (VerCauteren et al. 2000, Bynum et al. 2005, Avery et al. 2006, Yoder et al. 2006, Giunchi et al. 2007, Avery et al. 2008). For example, to reduce egg hatch in Canada geese, geese must consume nicarbazin at 2,500 ppm compared to 5,000 ppm required to reduce egg hatch in pigeons (Avery et al. 2006, Avery et al. 2008). In pigeons, consuming nicarbazin at a rate that would reduce egg hatch in Canada geese did not reduce the hatchability of eggs in pigeons (Avery et al. 2006). With the rapid excretion of the two components of nicarbazin (DNC and HDP) in birds, non-targets birds would have to consume nicarbazin daily at sufficient doses to reduce the rate of egg hatching.

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

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

WS has reviewed the list of T&E species listed in Vermont and determined that the use of nicarbazin under the trade name OvoControl® P or OvoControl® G will have no effect on those species listed in the State. Restricting the use of the product to urban areas where target bird species are conditioned to feed along with the bait-type (pellets) of the product and the limited availability of the product during application ensures the use of nicarbazin will have no effect on T&E species.

Threats to human safety from the use of nicarbazin will likely be minimal if labeled directions are followed. The use pattern of nicarbazin will also ensure threats to public safety are minimal. Label requirements require treated bait to be applied on rooftops of buildings or other areas restricted to public access (*e.g.*, airports). The EPA has characterized nicarbazin as a moderate eye irritant. The FDA has established a tolerance of nicarbazin residues of 4 parts per million allowed in uncooked chicken muscle, skin, liver, and kidney (21 CFR 556.445). The EPA characterized the risks of human exposure as low for a similar product used to reduce egg hatch in Canada geese. The EPA also concluded that if human

consumption occurred, a prohibitively large amount of nicarbazin would have to be consumed to produce toxic effects (EPA 2005). Based on the use pattern of nicarbazin and if label instructions are followed, risks to human safety will be low with the primary exposure occurring to those handling and applying the product. Safety procedures required by the label, when followed, will minimize risks to handlers and applicators.

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

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

Overall, the use of nicarbazin would have no effect on non-target wildlife that may consume bait or consume carcasses of birds that have consumed bait, will not adversely affect human safety given the use restriction of the product that are found on the label, which if followed, will minimize human exposure to the product, will not adversely affect the aesthetic values of pigeon or goose populations since pigeons and geese are common in the State and the population decline would be gradual. The use of nicarbazin would likely be considered humane since only the hatching rate of eggs laid would be reduced after consumption with no apparent adverse affects to the pigeons or geese consuming bait or the chicks that do hatch from eggs. WS' potential use of nicarbazin under the proposed action would not adversely affect any aspect of the issues analyzed in detail in the EA and would allow for additional methods to be available for use in an integrated approach to managing damage caused by pigeons and/or Canada geese.

XV. CUMULATIVE IMPACTS

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

WS' bird damage management activities would be the primary federal program with damage management responsibilities; however, other entities may conduct similar activities in Vermont as permitted by the USFWS and the VFWD. Through ongoing coordination with the USFWS and the VFWD, WS is aware of such activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with other entities in the same area, but may conduct

activities at adjacent sites within the same timeframe. The potential cumulative impacts analyzed below could occur either as a result of WS' program activities over time or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals.

Cumulative Impacts on Wildlife Populations

Evaluation of activities relative to target species indicated that program activities will likely have no cumulative adverse affects on bird populations when targeting those birds responsible for damage. WS' actions would be occurring simultaneously, over time, with other natural processes and human generated changes that are currently taking place. These activities include, but are not limited to:

- Natural mortality of birds
- Human-induced mortality of birds through private damage management activities
- Annual harvest of certain bird species during regulated hunting seasons
- Human and naturally induced alterations of habitat
- Annual and perennial cycles in population densities

All those factors 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. The actions taken to minimize or eliminate damage are constrained as to scope, duration, and intensity for the purpose of minimizing or avoiding impacts to the environment. WS uses the Decision Model to evaluate damage occurring, including other affected elements and the dynamics of the damaging species; to determine appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992, USDA 1997, USDA 2004). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target species.

With management authority over birds in Vermont, the USFWS and the VFWD can adjust take levels, including the take of WS, to ensure population objectives for birds are achieved. Consultation and reporting of take by WS will ensure the USFWS and the VFWD considers any activities conducted by WS.

WS' take of birds in the State to alleviate damage and threats of damage have been of a low magnitude when compared to the total known take, population trends, and estimated populations (USDA 2004, 2007). WS' annual take of native birds in the State will occur under depredation permits issued by the USFWS and the VFWD. The USFWS and the VFWD considers all known take when determining population objectives for birds in the State and adjusts the number of birds that will be taken annually during the regulated hunting season and the number of birds taken for damage management purposes to achieve the population objectives. Any take by WS will occur at the discretion of the USFWS and the VFWD and any population declines or increases will be the collective objective for those species populations established by the USFWS and the VFWD. Therefore, the cumulative take of birds annually or over time by WS will occur at the desire of the USFWS and the VFWD as part of management objectives for those bird species in the State.

No cumulative adverse impacts on target and non-target wildlife are expected from WS' bird damage management actions based on the following considerations:

1. Historical outcomes of WS' damage management activities on wildlife

Bird damage management activities are conducted by WS only at the request of a cooperator to reduce damage that is occurring or to prevent damage from occurring and only after methods to be used are agreed upon by all parties involved. Only those birds identified as causing damage or posing a threat of damage are targeted by WS. WS annually monitors activities to ensure any potential impacts are identified and addressed. WS works closely with State and federal resource agencies to ensure damage management activities are not adversely impacting bird populations and that WS' activities are considered as part of management goals established by those agencies. Historically, WS' activities to manage damage caused by birds in Vermont have not reached a magnitude that would cause adverse impacts to the populations of those bird species in the State.

2. SOP and mitigation strategies built into the WS program

SOPs and mitigation measures are designed to reduce the potential negative effects of WS' actions on bird populations, and are tailored to respond to changes in wildlife populations which could result from unforeseen environmental changes. This would include those changes occurring from sources other than WS. Alterations in programs are defined through SOP and mitigation measures, and implementation is insured through monitoring, in accordance with the WS' Decision Model (Slate et al. 1992, USDA 1997, USDA 2004).

3. Current status of potentially affected wildlife species

Natural and human-induced mortality patterns for birds are expected to remain essentially unchanged in Vermont. This is true of elements outside WS' programs and the programs themselves. As a result, no cumulative adverse affects are expected from repetitive programs over time in the fairly static set of conditions currently affecting wildlife in Vermont.

Migratory Bird Treaty Act, as amended

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

Cumulative Impact Potential from Chemical Components

Carbon dioxide (CO_2) gas is an AVMA-approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds that have been chemically immobilized or captured in live traps. Live birds are placed in a container or chamber into which CO_2 gas is released. The birds quickly expire after inhaling the CO_2.

Egg oiling is a method for suppressing reproduction of birds by spraying a small quantity of food grade corn oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of the developing embryo. It has been found to be 96-100% effective in reducing hatchability (Pochop 1998, Pochop et al.1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not renest. The EPA has ruled that use of corn oil for this purpose is exempt

from registration requirements under FIFRA. This method is extremely target specific and is less labor intensive than egg addling.

Both of these chemical components have no adverse effect to non-target species since cormorant nests are easily discernible from other co-nesting species by shape, size and location and CO_2 requires the birds capture before use.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods used or recommended by the WS program may include exclusion through use of various barriers, minor habitat modification of structures or vegetation, live trapping and euthanasia of wildlife, harassment of wildlife, and shooting.

Some potential exists for cumulative impacts to human health and safety related to the harassment of roosting bird flocks such as blackbirds and European starlings in urban environments. If birds are dispersed from one site and relocate to another where human exposure to concentrations of bird droppings over time occurs, human health and safety could be threatened. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

XVI. SUMMARY OF CUMULATIVE IMPACTS

No significant cumulative environmental impacts are expected from activities considered under the supplement to the EA. Likewise, no significant cumulative impacts have been identified from the implementation of the proposed action in the EA since 2004. Under the proposed action, the reduction of wildlife damage and threats using an integrated approach employing both non-lethal and lethal methods would not have significant impacts on wildlife populations in Vermont or nationwide. WS continues to coordinate activities with federal, State, and local entities to ensure activities do not adversely impact wildlife populations. No risk to public safety is expected when WS' activities are conducted pursuant to the proposed action or the proposed supplement to the EA. The EA further describes and addresses cumulative impacts from the alternatives, including the proposed action.

XVII. PERSONS CONSULTED

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LITERATURE CITED:

AVMA. 2007. AVMA guidelines on euthanasia. American Veterinary Medical Association. http://www.avma.org/issues/animal_welfare/euthanasia.pdf. Accessed on February 2, 2009.

Avery, M.L., K.L. Keacher, and E.A. Tillman. 2006. Development of nicarbazin bait for managing rock pigeon populations. Pp 116-120 *in* R.M. Timm and J. M. O'Brien eds. Proceedings of the 22nd Vertebrate Pest Conference. University of California-Davis, Davis California 95616.

Avery, M.L., K.L. Keacher, and E.A. Tillman. 2008. Nicarbazin bait reduces reproduction in pigeons (*Columba livia*). Wildlife Research 35:80-85.

Beaver, B.V., W. Reed, S. Leary, B. McKiernan, F. Bain, R. Schultz, B.T. Bennett, P. Pascoe, E. Shull, L.C. Cork, R. Franis-Floyd, K.D. Amass, R. Johnson, R.H. Schmidt, W. Underwood, G.W. Thorton, and B.Kohn. 2001. 2000 Report of the AVMA Panel on Euthanasia. J. Am. Vet Med Assoc 218:669-696.

Bedard, J., A. Nadeau, and M. Lepage. 1995. Double-crested cormorant culling in the St. Lawrence River Estuary. Colonial Waterbirds 18 (Spec. Pub. 1): 78-85.

Bedard, J., A. Nadeau, and M. Lepage. 1999. Double-crested cormorant culling in the St. Lawerence River Estuary: results of a 5 year program. Pp 147-154 *in* M.E. Tobin, ed. Symposium on double-crested cormorants: Population status and management issues in the Midwest. 9 December 1997, Milwaukee, WI. Tech. Bull. 1879. Washington, D.C.

Blackwell, B.F., R.A. Dolbeer, and L.A. Tyson. 2000. Lethal control of piscivorous birds at aquaculture facilities in the northeast United States: effects on populations. North American Journal of Aquaculture 62:300-307.

Bynum, K.S., J.D. Eisemann, J.J. Johnston, and L.A. Miller. 2005. Development of nicarbazin as a reproductive inhibitor for resident Canada geese. Proceedings of the Wildlife Damage Management Conference. 11:179–189.

California Department of Pesticide Regulation. 2007. California Department of Pesticide Regulation Public Report 2007-8. http://www.cdpr.ca.gov/docs/registration/ais/publicreports/5944.pdf. Accessed November 20, 2008.

Casselman, J.M, and L.A. Marcogliese. 2005. Nearshore prey-fish abundance in Lake Huron in relation to double-crested cormorant abundance and nest density. International Association for Great Lake Research Conference Program and Abstracts. V. 2005

Cuthbert, F.J., L.R. Wires, and J.E. McKearnan. 2002. Potential impacts of nesting double-crested cormorants on great blue herons and black-crowned night herons in the U.S. Great Lakes Region. Journal of Great Lakes Research 28:145-154.

Coulter, M.W., and W.R Miller. 1968. Nesting biology of black ducks and mallards in northern New England. Vermont Fish and Wildlife Department Bulletin No. 68-2.

Duerr, A. E. 2007. Population dynamics, foraging ecology, and optimal management of Double-crested Cormorants on Lake Champlain. Unpublished Ph.D. Dissertation, University of Vermont, Burlington, Vermont.

EPA. 2005. Pesticide Fact Sheet: Nicarbazin – Conditional Registration. United States Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, Washington, DC 20460.

Giunchi, D., N.E. Baldaccini, G. Sbragia, and C. Soldatini. 2007. On the use of pharmacological sterilisation to control feral pigeon populations. Wildlife Research 34:306-318.

Hatch, J.J. 1995. Changing populations of double-crested cormorants. Colonial Waterbirds 18 (Spec. Publ. 1):8-24.

Hatch, J. J., and D.V. Weseloh. 1999. Double-crested Cormorant (*Phalacrocorax auritus*), 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/441doi:10.2173/bna.441.

Hebert, C.E., J. Duffe, D.V. C. Weseloh, E.M.T. Senese, G.D. Haffner. 2005. Unique island habitats may be threatened by double-crested cormorants. J. Wildl. Manage. 69:57-65.

Jarvie, S., H. Blokpoel, and T. Chipperfield. 1999. A geographic information system to monitor nest distributions of double-crested cormorants and black-crowned night herons at shared colony sites near Toronto, Canada. Pp 121-129 *in* M.E. Tobin, ed. Symposium on double-crested cormorants: Population status and management issues in the Midwest. 9 December 1997, Milwaukee, WI. Tech. Bull. 1879. Washington, D.C.

Jackson, J.A., and B.J.S. Jackson. 1995. The double-crested cormorant in the south-central United States: habitat and population changes of a feathered pariah. Colon. Waterbirds 18 (Spec. Publ. 1): 118-130.

Johnston, R.F. 1992. Rock Pigeon (*Columba livia*), 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/013doi:10.2173/bna.13. Accessed on November 20, 2008.

Korfanty, C., W.G. Miyasaki, and J.L. Harcus. 1999. Review of the population status and management of double-crested cormorants in Ontario. Pp 131-145 *in* M.E. Tobin, ed. Symposium on double-crested cormorants: Population status and management issues in the Midwest. 9 December 1997, Milwaukee, WI. Tech. Bull. 1879. Washington, D.C.

Lake Champlain Steering Committee. 2003. Opportunities for action: An evolving plan for the future of the Lake Champlain Basin. Lake Champlain Basin Program. http://www.lcbp.org/OFA-APRIL2003/Final-April03.pdf. Accessed March 24, 2010.

Lemmon, C.R., G. Burgbee, and G.R. Stephens. 1994. Tree damage by nesting double-crested cormorants in Connecticut. Connecticut Warbler 14:27-30.

Lewis, H.F. 1929. The natural history of the double-crested cormorant (*Phalacrocorax auritus*). Ru-Mi-Lou Books, Ottawa, Ontario.

NYSDEC. 2009. Summary: New York Statewide Angler Survey 2007. New York State Department of Environmental Conservation, Bureau of Fisheries, Albany, NY.

Pochop, P.A. 1998. Comparison of white mineral oil and corn oil to reduce hatchability of ring-billed gull eggs. Proc. Vertebr. Pest Conf. 18:411-413.

Pochop, P.A., J.L. Cummings, J.E. Steuber, and C.A. Yoder. 1998. Effectiveness of several oils to reduce hatchability of chicken eggs. J. Wildl. Manage. 62:395-398.

Ridgway, M.S., S.W. Milner, T.A. Middel, and J.M. Casselman. 2006*a*. Double-crested cormorant and coastal fish monitoring and assessment in the North Channel and Georgian Bay, Lake Huron: Field methods, site descriptions and analysis information. Ontario Ministry of Natural Resources. 67 p.

Ridgway, M.S., J.B. Pollard, and D.V.C. Weseloh. 2006*b*. Density-dependent growth of double-crested cormorant colonies on Lake Huron. Canadian Journal of Zoology. 84:1409-1420.

Rudstam, L.G., A. VanDeValk, C.M. Adams, J.T.H. Coleman, J.L. Forney, and M.E. Richmond. 2004. Cormorant predation and the population dynamics of walleye and yellow perch in Oneida Lake. Ecological Applications, 14:149-163.

Sauer, J. R., J. E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966 - 2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD. Accessed September 28, 2009.

Seamans, M.E., J.P. Ludwig, K. Stromborg, F.E. Ludwig II, and F.E. Ludwig. 2008. Annual survival of Double-crested Cormorants from the Great Lakes, 1979-2006. Unpublished Report.

Shieldcastle, M.C., and L. Martin. 1999. Colonial waterbird nesting on west sister island national wildlife refuge and the arrival of double-crested cormorants. Pp 115-119 *in* M.E. Tobin, ed. Symposium on double-crested cormorants: Population status and management issues in the Midwest. 9 December 1997., Milwaukee, WI. Tech. Bull. 1879. Washington, D.C.

Shwiff, S., and T. Devault. 2009. The economic impact of double-crested cormorants to Central New York. Unpublished report. National Wildlife Research Center, USDA/APHIS/WS, Fort Collins, CO.

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

Tyson, L.A., J.L. Belant, F.J. Cuthbert, and D.V. Weseloh. 1999. Nesting populations of double-crested cormorants in the United States and Canada. Pp. 17-25 *in* M.E. Tobin, ed. Symposium on double-crested cormorants: Population status and management issues in the Midwest. 9 December 1997, Milwaukee, WI. Tech. Bull. 1879. Washington, D.C.

USDA. 2003. Environmental Assessment: Reducing Ring-billed Gull, Herring Gull, Great Black-backed Gull, and Double-crested Cormorant Damage Through an Integrated Wildlife Damage Management Program in the State of New York. USDA,APHIS,WS, 1930 Route 9, Castleton, New York 12033.

USDA. 2004. Environmental Assessment: Reducing Bird Damage through and Integrated Wildlife Damage Management Program. USDA/APHIS/WS, 59 Chenell Drive, Suite 7, Concord, NH 03301.

USDA. 2007. Amendment to the Environmental Assessment: Reducing Bird Damage through and Integrated Wildlife Damage Management Program. USDA/APHIS/WS, 59 Chenell Drive, Suite 7, Concord, NH 03301.

USDA. 1997. Animal Damage Control Program: Final Environmental Impact Statement (revised). USDA, APHIS,WS-Operational Support Staff, 4700 River Road, Unit 87, Riverdale, Maryland 20737.

USFWS. 1995. Report to Congress: Great Lakes Fishery Resources Restoration Study.

USFWS. 1999. Final Environmental Assessment: Of a U.S. Fish and Wildlife Service Action to Issue a Migratory Bird Depredation Permit For the Take of Cormorants and Gulls on Lake Champlain Islands, Vermont.

USFWS. 2003. Final Environmental Impact Statement: Double-crested Cormorant Management. U.S. Dept. of the Interior, USFWS, Div. of Migratory Bird Management, 4401 N. Fairfax Drive MS 634, Arlington, VA 22203.

USFWS. 2005. Final Environmental Impact Statement: Resident Canada goose management. United States Fish and Wildlife Service, Division of Migratory Birds. Arlington, Virginia. http://www.fws.gov/migratorybirds/issues/cangeese/finaleis.htm. Accessed November 24, 2009.

USFWS. 2007. Final Environmental Impact Statement: Light goose management. United States Fish and Wildlife Service. http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/snowgse/tblcont.html. Accessed on December 9, 2009.

USFWS. 2009*a*. Environmental Assessment: Extended management of double-crested cormorants under 50 CFR 21.47 and 21.48. United States Fish and Wildlife Service, Division of Migratory Bird Management, 4401 N. Fairfax Drive, Mail Stop 4107, Arlington, VA 22203.

USFWS. 2009*b*. New England Cottontail. Species Assessment and Listing Priority Assignment Form. United States Fish and Wildlife Service, New England Field Office, 70 Commercial Street, Suite 300, Concord, NH 03301.

VanDeValk, A.J., C.M. Adams, L.G. Rudstam, J.L. Forney, T.E. Brooking, M.A. Gerken, B.P. Young, and J.T. Hooper. 2002. Comparison of angler and cormorant harvest of walleye and yellow perch in Oneida Lake, New York. Trans. Am. Fish. Soc. 131:27-39.

VerCauteren, K.C., M.J. Pipas, and K.L. Tope. 2000. Evaluations of nicarbazin-treated pellets for reducing the laying and viability of Canada Goose eggs. Proc. Eastern Wildl. Damage Management Conf., State College, Pennsylvania. 337-346.

VFWD. 2006. Lake Champlain Islands Wildlife Management Area long-range management plan. State Vermont, Agency of Natural Resources, Vermont Fish and Wildlife Department, Waterbury, VT.

Weseloh, D.V., and B. Collier. 1995. The rise of the double-crested cormorant on the Great Lakes: winning the war against contaminants. Great Lakes Fact sheet. Canadian Wildlife Service, Environment Canada and Long Point Observatory.

Weseloh, D.V., and P.J. Ewins. 1994. Characteristics of a rapidly increasing colony of double-crested cormorants (*Phalacrocorax auritus*) in Lake Ontario: population size, reproductive parameters and band recoveries. J. Great Lakes Res. 20:443-456.

Weseloh, D.V., C. T. Havelka, F. J. Cuthbert, and S. Hanisch. 2006. The 2005 Great Lakes-wide census of nesting double-crested cormorants. Unpublished report. Canadian Wildlife Service, 4905 Dufferin St., Downsview, ON M3H 5T4

Weseloh, D. V., P. J. Ewins, J. Struger, P. Mineau, C. A. Bishop, et al. 1995. Double-crested Cormorants of the Great Lakes: Changes in population size, breeding distribution and reproductive output

between 1913 and 1991. Colon. Waterbirds 18 (Spec. Publ.1):48-59.

Wires, L.R. and Cuthbert, F.J. 2001. Prioritization of waterbird colony sites for conservation in the U.S. Great Lakes. Final Report to USFWS.

Wires, L.R., F.J. Cuthbert, D.R. Trexel, and A.R. Joshi. 2001. Status of the Double-crested Cormorant (*Phalacrocorax auritus*) in North America. Final Report to USFWS.

World Health Organization. 1998. Toxicological evaluation of certain veterinary drug residues in foods. World Health Organization, International Programme on Chemical Safety. http://www.inchem.org/documents/jecfa/jecmono/v041je10.htm. Accessed November 20, 2008.

Yoder, C.A., L.A. Miller, and K.S. Bynum. 2005. Comparison of Nicarbazin absorption in chickens, mallards, and Canada geese. Poultry Science 84:1491-1494.

APPENDIX A
KNOWN CORMORANT NESTING SITES ON LAKE CHAMPLAIN

Figure 1 – Cormorant nesting sites on Lake Champlain, 1999-2009