ENVIRONMENTAL ASSESSMENT

Reducing Bird Damage
through an
Integrated Wildlife Damage Management Program
in the
State of Vermont

Prepared By:

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

In Cooperation With:

THE VERMONT DEPARTMENT OF FISH AND WILDLIFE (VTFW)
AND THE UNITED STATES FISH AND WILDLIFE SERVICE (USFWS)

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SUMMARY OF PROPOSED ACTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to bird damage in the State of Vermont. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce bird damage to property, agricultural resources (including livestock), natural resources, and human/public health and safety. Damage management would be conducted on public and private property in Vermont when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using: shooting, trapping, egg addling/destruction, nest destruction, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

Bird damage management activities would be conducted in the State, when requested and funded, on private or public property, including airport facilities and adjacent or nearby properties, after an *Agreement for Control* or other comparable document has been completed. All management activities would comply with appropriate Federal, State, and Local laws, including applicable laws and regulations authorizing take of birds, and their nest and eggs.

Producers, property owners, agency personnel, corporations, or others could conduct bird damage mangement using any legal lethal or non-lethal method available to them. Following U.S. Fish and Wildlife Service (USFWS) review of a complete justified application (USDA –Wildlife Damage Report –Form 37A, Depredation Permit Application) for a depredation permit from a property owner to take specified bird species, a depredation permit could be issued by USFWS. Upon receipt of a USFWS depredation permit, the permittee (or any listed sub-permittee) may commence the authorized activities and must submit a written report of their activities upon expiration of their permit to the USFWS. Permits may be renewed yearly by the USFWS as needed to resolve the damages, after going through the reauthorization process which includes justification. Not all of the methods listed in Appendix B as potentially available to WS would be legally available to property owners.

ACRONYMS

ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BDM	Bird Damage Management
CBC	Christmas Bird Count
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
TGE	Transmissible Gastroenteritis
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
UVM	University of Vermont
VTAAFM	Vermont Agency of Agriculture, Food & Markets
VTAOT	Vermont Agency of Transportation
VTDEC	Vermont Department of Environmental Conservation
VTFW	Vermont Fish and Wildlife Department
VTDH	Vermont Department of Health
VTPID	VTAAFM, Plant Industry Division
WS	Wildlife Services

NOTE: On August 1, 1997, the Animal Damage Control program was officially renamed to Wildlife Services. The phrases Animal Damage Control, ADC, Wildlife Services, and WS are used synonymously throughout this Environmental Assessment.

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with wildlife which increases the potential for conflicting human/wildlife interactions. In addition, segments of the public desire protection for all wildlife; this protection can create localized conflicts between human and wildlife activities. The *Animal Damage Control Programmatic Final Environmental Impact Statement* (EIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way United States Department of Agriculture (USDA) 1997}:

> "*Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife is generally regarded as providing economic, recreational and aesthetic benefits . . . and the mere knowledge that wildlife exists is a positive benefit to many people. However . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and value is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural and economic considerations as well.*"

Wildlife damage management is the science of reducing damage or other problems associated with wildlife and is recognized as an integral part of wildlife management (The Wildlife Society 1990). The USDA, Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program (formerly known as Animal Damage Control) uses an Integrated Wildlife Damage Management (IWDM) approach, known as Integrated Pest Management (WS Directive 2.105[1]), in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1:1-7 of USDA (1997). These methods may include alteration of cultural practices and habitat and behavioral modification to prevent or reduce damage. The reduction of wildlife damage may also require that local populations be reduced through lethal means.

This environmental assessment (EA) documents the analysis of the potential environmental effects of a proposed bird damage management (BDM) program. This analysis relies on data contained in published documents (Appendix A), including the *Animal Damage Control Program Final Environmental Impact Statement* (USDA 1997). The final environmental impact statement (USDA 1997) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

WS is the federal agency directed by law and authorized to protect American resources from damage associated with wildlife (Animal Damage Control Act of March 2, 1931, as amended (46 Stat. 1486; 7 U.S.C. 426-426c) and the Rural Development, Agriculture, Related Agencies Appropriations Act of 1988, Public Law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 U.S.C. 426c), and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767). To fulfill this Congressional direction, WS activities are conducted to prevent or reduce wildlife damage caused to agricultural, industrial and natural resources; property; livestock; and threats to public health and safety on private and public lands in cooperation with federal, state and local agencies, private organizations, and individuals. Therefore, wildlife damage management is not based on punishing offending animals but as one means of reducing damage and is used as part of the WS Decision Model (Slate et al. 1992). The imminent threat of damage

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[1] WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Program Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Appendix.

or loss of resources is often sufficient for individual actions to be initiated. The need for action is derived from the specific threats to resources or the public.

Normally, according to the APHIS procedures implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions may be categorically excluded {7 CFR 372.5(c), 60 Fed. Reg. 6,000 -6,003, (1995)}. WS has decided in this case to prepare this EA to facilitate planning, interagency coordination, and the streamlining of program management, and to clearly communicate with the public the analysis of individual and cumulative impacts. In addition, this EA has been prepared to evaluate and determine if there are any potentially significant or cumulative impacts from the proposed and planned damage management program. All wildlife damage management that would take place in Vermont would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA). Notice of the availability of this document will be published in newspapers, consistent with the agency's NEPA procedures.

WS is a cooperatively funded, service-oriented program that receives requests for assistance from private and public entities, including other governmental agencies. Before any wildlife damage management is conducted, Cooperative Agreements, Agreements for Control or other comparable documents are in place. As requested, WS cooperates with land and wildlife management agencies to reduce wildlife damage effectively and efficiently according to applicable federal, state and local laws and Memorandums of Understanding (MOUs) between WS and other agencies. WS's mission, developed through its strategic planning process, is

1) *"to provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and*

2) to safeguard public health and safety."

WS's Policy Manual reflects this mission and provides guidance for engaging in wildlife damage management through:

- Training of wildlife damage management professionals;
- Development and improvement of strategies to reduce losses and threats to humans from wildlife;
- Collection, evaluation, and dissemination of management information;
- Informing and educating the public on how to reduce wildlife damage;
- Providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989)

1.1 AUTHORITY AND COMPLIANCE

1.1.1 Wildlife Services Legislative Authority

The USDA is directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services program is the Act of March 2, 1931, as amended (46 Stat. 1486; 7 U.S.C. 426-426c) and the Rural Development, Agriculture, Related Agencies Appropriations Act of 1988, Public Law 100-102, Dec. 27, 1987. Stat. 1329-1331 (7 U.S.C. 426c), and the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001, Public Law 106-387, October 28, 2000. Stat. 1549 (Sec 767), which provides that:

> *"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services*

authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."

Since 1931, with changes in societal values, WS policies and its programs place greater emphasis on the part of the Act discussing "bringing (damage) under control", rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative directive and authority of WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

> *"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammals and birds species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."*

1.1.2 Vermont Agency of Agriculture, Food & Markets

The mission of the Vermont Agency of Agriculture, Food & Markets (VTAAFM) consists of four divisions and 88 employees. The Agency's mission is to protect animal health and welfare and the public health, maintain and improve environmental quality, maintain and support the viability of the Vermont agricultural industry and ensure consumer equity in commerce.

1.1.3 Vermont Fish and Wildlife Department

The mission of the VTFW is to protect and conserve our fish, wildlife, plants and their habitats for the people of Vermont. VTFW handles wildlife damage management problems involving black bear, deer, rabbit and fur-bearer species. The VTFW forwards citizens' request for migratory bird damage management to WS. The VTFW cosigns Federal depredation permits that authorize take of migratory game birds. WS and the VTFW cooperatively assist VT airports with wildlife hazard management issues related to mammals, such as white-tailed deer. The VTFW Non-game and Natural Heritage Program (NNP) administers programs related to non-game birds such as vultures and gulls, and conducts management and education programs for endangered, threatened, and non-game wildlife species in VT.

1.1.4 Vermont Agency of Agriculture, Food & Markets, Plant Industry Division

The VTAAFM Plant Industry Division (VTPID) enforces state laws pertaining to the use and application of pesticides, including those related to the registration of pesticide products, licensing of private and commercial pesticide applicators, and licensing of pesticide businesses. The VTPID implements regulations found in V.S.A. Title 6 Chapter 87, Sections 1101-1112. Pesticide products for bird damage control are registered through the VTPID by USDA APHIS WS and other entities (eg. pesticide manufacturers).

1.1.5 Vermont Department of Health

The VTDH, VTFW and VTAAFM currently has a cooperative agreement with WS, which establishes a cooperative relationship between WS and these agencies with responsibilities for resolving wildlife damage management situations when it concerns a rabies threat in Vermont. The VTDH provides technical guidance to WS on public health related issues and potential health problems associated with wildlife, and refers callers with wildlife damage related questions to WS.

1.1.6 U.S. Fish and Wildlife Service (USFWS)

The USFWS is responsible for managing and regulating take of bird species that are listed as migratory under the Migratory Bird Treaty Act (MBTA) and those that are listed as threatened or endangered under the ESA. In VT, the USFWS administers two National Wildlife Refuges (Missisgquoi NWR and Silvio O. Conte NR&W), one Law Enforcement Office (in Essex Junction, VT), and two National Fish Hatcheries (Pittsford and Bethel, VT).

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

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

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

CFR 50 Subchapter C - The National Wildlife Refuge System - Part 30 - Feral Animals - Subpart B-30.11 - Control of feral animals states: (a) Feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized federal or state personnel or by private persons operating under permit in accordance with applicable provisions of federal or state law or regulation.

1.1.7 Compliance with Federal and State Statutes

Several federal laws, state laws, and state regulations regulate WS wildlife damage management. WS complies with these laws and regulations, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act. Environmental documents pursuant to NEPA must be completed before operational activities consistent with the NEPA decision can be implemented. This EA meets the NEPA requirement for the proposed action in Vermont. When WS direct management assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS could agree to complete NEPA documentation at the request of the other federal agency. WS also coordinates specific projects and programs with other agencies. The purpose of these contacts is to coordinate any wildlife damage management that may affect resources managed by these agencies or affect other areas of mutual concern.

Endangered Species Act (ESA). It is federal policy, under the ESA, that all federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the Act (Sec. 2(c)). WS conducts Section 7 consultations with the United States Fish and Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "any action authorized, funded or carried out by such an agency... is not likely to jeopardize the continued existence of any endangered or threatened species . . . each agency shall use the best scientific and commercial data available" (Sec. 7(a)(2)). WS obtained a Biological Opinion (B.O.) from the U.S. Fish and Wildlife Service describing potential effects on T&E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). As part of the cormorant FEIS (USFWS 2003), the USFWS completed an intra-Service biological evaluation and informal Section 7 consultation on the management of double-crested cormorants in the U.S. Additionally, WS conferred with the USFWS in preparation of this EA

during 2004, regarding an analysis of potential impacts to Federally listed and candidate species (Appendix D) in VT.

Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as Amended. The MBTA provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any "*take*" of these species by any entities, except as permitted or authorized by the USFWS.

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

European starlings, rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves) and House sparrows are not classified as protected migratory birds and therefore have no protection under the MBTA.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The U.S. Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into the WS program in Vermont are registered with and regulated by the EPA and Vermont Agency of Agriculture, Food & Markets Plant Industry Division (VTPID) and used by WS in compliance with labeling procedures and other requirements.

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

Executive Order 13112 of February 3, 1999. This Order prevents the introduction of invasive species and provides for their control to minimize the economic, ecological, and human health impacts that invasive species cause. Pigeons, starlings, and House sparrows are recognized as invasive species that have adverse economic, ecological, and human health impacts.

Executive Order 13186 of January 10, 2001 "Responsibilities of Federal Agencies to Protect Migratory Birds." This Order states that each federal agency, taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations, is directed to develop and implement, a MOU with the USFWS that shall promote the conservation of migratory bird populations. WS has developed a draft MOU with the USFWS as required by this Order and is currently waiting for USFWS approval. WS will abide by the MOU once it is finalized and signed by both parties.

Occupational Safety and Health Act of 1970. The Occupational Safety and Health Act of 1970 and its implementing regulations (29CFR1910) on sanitation standards states that, "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practical, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected." This standard includes birds that may cause safety and health concerns at workplaces.

The Native American Graves and Repatriation Act of 1990. The Native American Graves Protection and Repatriation Act requires federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal

projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

National Historic Preservation Act (NHPA) of 1966 as amended. The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that has the potential to cause effects on historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the Advisory Council on Historic Preservation (i.e. State Historic Preservation Office, Tribal Historic Preservation Officers), as appropriate. WS actions on tribal lands are only conducted at the tribe's request and under signed agreement; thus, the tribes have control over any potential conflict with cultural resources on tribal properties.

Each of the WDM methods described in Appendix B that might be used operationally by WS do not cause major ground disturbance, do not cause any physical destruction or damage to property, do not cause any alterations of property, wildlife habitat, or landscapes, and do not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

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

Environmental Justice and Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." Executive Order 12898, promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental justice is the pursuit of equal justice and protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. Environmental Justice is a priority within APHIS and WS. Executive Order 12898 requires federal agencies to make environmental justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations. APHIS implements Executive Order 12898 principally through its compliance with NEPA. All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898.

WS personnel use only legal, effective, and environmentally safe wildlife damage management methods, tools, and approaches. All chemicals used by WS are regulated by the EPA through FIFRA, Vermont Agency of Agriculture, Food & Markets Plant Industry Division (VTPID), by MOUs with land managing agencies, and by WS Directives. Based on a thorough Risk Assessment, APHIS concluded that when WS program chemicals are used according to label directions, they are selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997, Appendix P). The WS operational program properly disposes of any excess solid or hazardous waste. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and

low-income persons or populations. In contrast, the proposed action may benefit minority or low-income populations by reducing bird damage such as threats to public health and safety.

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045). Children may suffer disproportionately from environmental health and safety risks for many reasons, including their development physical and mental status. Because WS makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, WS has considered the impacts that this proposal might have on children. The proposed bird damage management program would only occur by using legally available and approved methods where it is highly unlikely that children would be adversely affected. For these reasons, WS concludes that it would not create an environmental health or safety risk to children from implementing this proposed action.

Vermont Wildlife Laws, Regulations and Policies Regarding Bird Damage Management

Vermont Statutes Annotated (V.S.A.) Title 10 contains fish, game, and wildlife law for the State of Vermont.

1. VSA 10:113 sec. 4902 Wild birds generally; no open season; exception. Wild birds, other than pigeons, shall not be taken, possessed, bought or sold, at any time, except as provided by this part, rules of the board or orders of the commissioner. Birds coming from without the state belonging to the same family as those protected by this subchapter shall not be bought or sold.
2. VSA 10:113 sec. 4904 Use of light, snares, traps. A person shall not take a bird with the aid of a jack or other light. A person shall not take a wild bird by trapping, netting or snaring, or possess such a bird so taken, or set, place or use, where birds may be taken, a net trap or snare for taking bird. Such a net, trap or snare is hereby declared to be a public nuisance and may be summarily abated and destroyed by any person, and game wardens shall seize and destroy such devices. The commissioner, however, may authorize the taking of birds by nets or traps or other devices, under such regulations as he may prescribe.
3. VSA 10:113 sec. 4905 Birds' nests and eggs; destroying or robbing A person shall not take or willfully destroy the nests or eggs of wild birds, other than pigeons, the House sparrow, starling, or purple grackle, except when necessary to protect buildings or when taken as provided in section 4152 of this title.

Vermont regulations necessary to implement laws. Bird damage–related laws and regulations are summarized here.

1. Vermont currently does not have a statute pertaining to bird damage to agriculture, but instead VTFW adopts the provisions of Federal Depredation Order 50 CFR 21.43, a person may kill yellow-headed, red-winged, bi-colored red winged, tri-colored red-winged, and Brewer's blackbirds, cowbirds, all grackles, common crows and magpies when found committing or about to commit serious depredations upon any ornamental or shade tree, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

Vermont Pesticide Laws

Vermont's pesticide regulations, V.S.A. Title 6 Chapter 87, Section I-XIII, are implemented and enforced by the VTAAFM Plant Industry Division (VTPID). These regulations include processes and requirements licenses, certificates and permits issued by the VAAFM (Section II), restrictions on the use and application of pesticides (Section IV), Maintenance of records by certified applicators, licensed companies, licensed pesticide dealers and pesticide producing establishments (Section V), company license (Section VI), requirements for certified commercial and certified noncommercial applicators (Section VII), certification standards for commercial applicators and noncommercial applicators using other than Class "C" pesticides (Section VIII), certification of private applicators (Section IX), classification of pesticides and limitations on sale (Section X), pesticide dealer licenses (Section XI), community right-to-know requirements and accident reporting (Section XII) and transportation, storage and disposal of pesticides (Section XIII). In

order for WS to apply a restricted use pesticide as part of bird damage management in VT, the product must be registered with the VTPID, the applicator must be certified, the applicator possess a VT pesticide applicator certificate. Additionally, label instructions, and all other pesticide and wildlife laws and regulations must be adhered to (eg. Possession of a depredation permit from the USFWS and/or the VTFW to take the protected bird species). Pesticide products are registered annually, and applicator certificates are obtained and maintained through completion of training courses and examinations conducted through the VTPID.

1.2 SCOPE AND PURPOSE OF THIS EA

The scope and purpose of this EA is to address and evaluate the potential impact to the human environment from the implementation of a WS BDM program to protect agricultural resources; natural resources property; livestock; and public health and safety in Vermont. Damage problems can occur throughout the State, resulting in requests for WS assistance. Under the Proposed Action, BDM could be conducted on private, federal, state, tribal, county, and municipal lands in Vermont upon request.

The purpose of this EA is to analyze the effects of WS activities in Vermont to manage damage caused by bird species or species groups that include, but are not necessarily limited to the following: feral pigeon (*Columbia livia*), European starling (*Sturnus vulgaris*), House sparrow (*Passer domesticus)*, herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), greater black-backed gull (*Larus marinus*), double-crested cormorant (*Phalacrocorax auritus*), Canada goose (*Branta canadensis*), snow goose (*Chen caerulescens*), mallard duck (*Anas platyrhynchos*), domestic waterfowl (ducks and geese), red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), killdeer (*Charadrius vociferus*), wild turkey (*Meleagris gallopavo*), snow bunting (*Plectrophenax nivalis*), great blue heron (*Ardea herodias*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), pileated woodpecker (*Dryocopus pileatus*), Great Horned Owl (*Bubo virginianus*), Barred Owl (*Strix varia*), rough-legged hawk (*Buteo lagopus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), broad-winged hawk (*Buteo platypterus*) , red-shouldered hawk (*Buteo lineatus*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), Northern goshawk (*Accipiter gentilis*), Northern saw-whet owl (*Aegolius acadicus*), long-eared owl (*Asio otus*), common barn owl (*Tyto alba*), and Eastern screech owl (*Otus asio*).

1.3 NEED FOR ACTION

Conflicts between humans and wildlife are common in Vermont. The need for action in Vermont is based on the necessity for a program to protect agriculture, property, livestock, natural resources, and human health and safety from bird damage. Bird populations can have a negative economic impact in Vermont. Comprehensive surveys of bird damage in Vermont have not been conducted. These data represent only a portion of the total damage caused by birds because not all people who experience damage request assistance from WS.

1.3.1 Need for Bird Damage Management to Protect Human Health and Safety

In Vermont human health and safety concerns and problems associated with birds include, but are not limited to transmission of zoonotic diseases to humans, injury from aggressive waterfowl, and bird-aircraft strikes.

Birds play an important role in the transmission of zoonotic diseases to humans such as Encephalitis, West Nile Virus, Psittacosis, and Histoplasmosis. Public health officials and residents at such sites express concerns for human health related to the potential for disease transmission where dropping deposits

accumulate. Some bird species form large communal roosts of the kind associated with disease organisms which grow in soils enriched by bird excrement, such as *Histoplasma capsulatum* (Weeks and Stickley 1984). Sometimes, such roosts occur in urban and suburban areas.

Rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves), House sparrows, and European starlings have been suspected in the transmission of 29 different diseases to humans (Davis et al. 1971, Stickley and Weeks 1985, and Weber 1979). These include viral diseases such as meningitis and seven different forms of encephalitis; bacterial diseases such as erysipeloid, salmonellosis, paratyphoid, Pasteurellosis, and Listeriosis; mycotic (fungal) diseases such as aspergillosis, blastomycosis, candidiasis, cryptococcosis, histoplasmosis, and sarcosporidiosis; protozoal diseases such as American trypansomiasis and toxoplasmosis; and rickettsial/chlamydial diseases such as chlamydiosis and Q fever. As many as 65 different diseases transmittable to humans or domestic animals have been associated with pigeons, European starlings, and House sparrows (Weber 1979). Table 1-1 shows the more typical diseases affecting humans that can be transmitted by pigeons, House sparrows, and European starlings.

Table 1-1. Diseases transmissible to humans and livestock that are associated with rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves), European starlings, and House sparrows (from Weber 1979).

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

	drowsiness, disorientation	encephalomyelitis may be around 60%	convulsions and paralysis
Mycotic (fungal):			
Aspergillosis	affects lungs and broken skin, toxins poison blood, nerves, and body cells	not usually	causes abortions in cattle
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	rarely	affects horses, dogs and cats
Candidiasis	infection of skin, fingernails, mouth, respiratory system, intestines, and urogenital tract	rarely	causes mastitis, diarrhea, vaginal discharge and aborted fetuses in cattle
Cryptococcosis	lung infection, cough, chest pain, weight loss, fever or dizziness, also causes meningitis	possible especially with meningitis	chronic mastitis in cattle, decreased milk flow and appetite loss
Histoplasmosis	pulmonary or respiratory disease. May affect vision	possible, especially in infants and young children or if disease disseminates to the blood and bone marrow	actively grows and multiplies in soil and remains active long after birds have departed
Protozoal:			
American Trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
Toxoplasmosis	inflammation of the retina, headaches, fever, drowsiness, pneumonia, strabismus, blindness, hydrocephalus, epilepsy, and deafness	possible	may cause abortion or still birth in humans, mental retardation
Rickettsial /Chlamydial:			
Chlamydiosis	pneumonia, flu-like respiratory infection, high fever, chills, loss of appetite, cough, severe headaches, generalized aches pains, vomiting, diarrhea, hepatitis, insomnia, restlessness, low pulse rate	occasionally, restricted to old, weak or those with concurrent diseases	in cattle, may result in abortion, arthritis, conjunctivitis, and enteritis
Q Fever	sudden pneumonitis, chills, fever, weakness, severe sweating, chest pain, severe headaches and sore eyes	possible	may cause abortions in sheep and goats

Research has shown that gulls carry various species of bacteria such as *Bacillus* sp., *Clostridium* sp., *Campylobacter* spp., *Escherichia coli*, *Listeria* spp., and *Salmonella* spp. (MacDonald and Brown 1974, Fenlon 1981, Butterfield et al. 1983, Monaghan et al. 1985, Norton 1986, Vauk-Hentzelt et al. 1987,

Quessey and Messier 1992). Transmission of bacteria from gulls to humans is difficult to document, however, Reilley et al. (1981) and Monaghan et al. (1985) both suggested that gulls were the source of contamination for cases of human salmonellosis. Concentrations of gulls at municipal water supply sources and waste water and sewage treatment facilities may also contribute to disease transmission (Jones et al. 1978, Hatch 1996). Public health concerns often arise when gulls feed and loaf near fast food restaurants, and picnic facilities; deposit waste from landfills in urban areas; and contaminate industrial facility ventilation systems with feathers, nesting debris, and droppings. Gulls feeding on vegetable crops and livestock feed can potentially aid in the transmission of salmonella.

Double-crested cormorants (DCCO) are a potential risk to human health and safety (USFWS 2003b). Of concern are the potential impacts that cormorants may have on water quality. Concerns about water quality and DCCOs exist on two levels: contaminants and pathogens (USFWS 2003b). Waterbird excrement can contain coliform bacteria, streptococcus bacteria, Salmonella, toxic chemicals, and nutrients, and it is known to compromise water quality, depending on the number of birds, the amount of excrement, and the size of the water body. Elevated contaminant levels associated with breeding and/or roosting concentrations of DCCOs and their potential effects on groundwater supplies are the major concerns regarding DCCO impacts to human health.

Canada goose conflicts may potentially impact human health. A foraging Canada goose defecates between 5.2 and 8.8 times per hour (Bedard and Gauthier 1986). Kear (1963 In Allan et al. 1995) recorded a maximum fecal deposition rate for Canada geese of 0.39 pounds per day (dry weight). Public swimming beaches, private ponds, and lakes have been affected by goose droppings. There are several pathogens involving waterfowl which may be contracted by humans, however, the risk of infection is believed low.

Cryptosporidiosis is a disease caused by the parasite Cryptosporidium parvum and was not known to cause disease in humans until as late as 1976 (Centers for Disease Control and Prevention (CDCP) 1998). A person can be infected by drinking contaminated water or direct contact with the droppings of infected animals (CDCP 1998). The public is advised to be careful when swimming in lakes, ponds, streams, and pools, and to avoid swallowing water while swimming (Colley 1996). The public is also advised to avoid touching stools of animals and to drink only safe water (Colley 1996). Cryptosporidium can cause gastrointestinal disorders (Virginia Department of Health 1995) and produce life-threatening infections in immunocompromised and immunosuppressed people (Roffe 1987, Graczyk et al. 1998). Cryptosporidiosis is recognized as a disease with implications for human health (Smith et al. 1997). Canada geese in Maryland were shown with molecular techniques to disseminate infectious Cryptosporidium parvum oocysts through mechanical means in the environment (Graczyk et al. 1998).

Giardiasis (Giardia lambia) is an illness caused by a microscopic parasite that has become recognized as one of the most common causes of waterborne disease in humans in the United States during the last 15 years (CDCP 1999). Giardiasis is contracted by swallowing contaminated water or putting anything in your mouth that has touched the stool of an infected animal or person, and causes diarrhea, cramps and nausea (CDCP 1999). Canada geese in Maryland were shown with molecular techniques to disseminate infectious Giardia sp. cysts in the environment (Graczyk et al. 1998).

Salmonella (Salmonella spp.) may be contracted by humans by handling materials soiled with bird feces (Stroud and Friend 1987). Salmonella causes gastrointestinal illness, including diarrhea.

Chlamydia psittaci, which can be present in diarrhetic feces of infected waterfowl, can be transmitted if it becomes airborne (Locke 1987). Severe cases of Chlamydiosis have occurred among wildlife biologists and others handling snow geese, ducks, and other birds (Wobeser and Brand 1982). Chlamydiosis can be fatal to humans if not treated with antibiotics. Waterfowl,

herons, and rock doves (pigeons) are the most commonly infected wild birds in North America (Locke 1987).

Escherichia coli (E. coli) are fecal coliform bacteria associated with fecal material of warm blooded animals. There are over 200 specific serological types of E. coli and the majority are harmless (Sterritt and Lester 1988). Probably the best known serological type of E. coli is E. coli O157:H7, which is a harmful E. coli usually associated with cattle (Gallien and Hartung 1994). This was the rationale for testing public water supplies that was developed in the United States and Europe at the turn of the century to reduce the incidence of waterborne diseases. Regardless of whether the serological types of E. coli disseminated into watersheds by geese are proven to be harmful to humans, it has been demonstrated that Canada geese can disseminate E. coli into the environment and result in elevated fecal coliform densities in the water column (Hussong et al. 1979). Many communities monitor water quality at swimming beaches, but lack the financial resources to pinpoint the source of elevated fecal coliform counts. When fecal coliform counts at swimming beaches exceed established standards the beaches are temporarily closed adversely affecting the human quality of life, even though they may not have been able to determine the serological type of the E. coli. Unfortunately, linking the elevated bacterial counts to frequency of waterfowl use and attributing the elevated levels to human health threats has been problematic until recently. Advances in genetic engineering have allowed microbiologists to match genetic code of coliform bacteria to specific animal species and link these animal sources of coliform bacteria to fecal contamination (Jamieson 1998, Simmons et al. 1995). Simmons et al. (1995) used genetic fingerprinting to link fecal contamination of small ponds on [redacted] to waterfowl. Microbiologists were able to implicate waterfowl and gulls as the source of fecal coliform bacteria at the Kensico Watershed, a water supply for New York City (Klett et al. 1998). Also, fecal coliform bacteria counts coincided with the number of Canada geese and gulls roosting at the reservoir.

Roscoe (1999) conducted a survey to estimate the prevalence of pathogenic bacteria and protozoa in resident Canada geese in NJ, and found no Salmonella sp., Shigella sp., or Yersinia sp. isolated from any of the 500 Canada goose samples. However, he did report finding Cryptosporidium sp. in 49 (10%) of the 500 geese, and Giardia sp. in 75 (15%) of the geese. Additionally, the USGS (U.S. Geological Survey 2000) conducted field studies in NJ, VA, and MA to determine the presence of organisms that could cause disease in human exposed to feces of Canada geese at sites with a history of high public use and daily use by geese. Salmonella spp., Listeria spp., Chlamydia sp., and Giardia spp. were isolated from goose feces in New Jersey (U.S. Geological Survey 2000).

While transmission of disease or parasites from geese to humans has not been well documented, the potential exists (Luechtefeld et al. 1980,Wobeser and Brand 1982, Hill and Grimes 1984, Pacha et al. 1988, Blandespoor and Reimink 1991, Graczyk et al. 1997, Saltoun, et al. 2000). In worst case scenarios, infections may even be lifethreatening for immunocompromised and immunosuppressed people (Roffe 1987, Virginia Department of Health 1995, Graczyk et al. 1998). Even though many people are concerned about disease transmission from feces, the probability of contracting disease from feces is believed to be small. Financial costs related to human health threats involving resident Canada geese may include testing of water for coliform bacteria, cleaning and sanitizing beaches regularly of feces, contacting and obtaining assistance from public health officials, and implementing nonlethal and lethal methods of wildlife damage management. WS recognizes and defers to the authority and expertise of local and state health officials in determining what does or does not constitute a threat to public health.

In most cases, in which human health concerns are a major reason for requesting BDM, no actual cases of bird transmission of disease to humans have been proven to occur. Thus, it is the risk of disease transmission that is the primary reason for requesting and conducting BDM. Situations in Vermont where the threat of disease associated with bird populations might occur could be:

- exposure by residents to a European starling roost which has been in a residential area for more than three years;

- disturbance of a large deposit of droppings in an attic where a flock of rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves) routinely roosts or nests;

- accumulated droppings from roosting European starlings, rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves), or House sparrows on structures at an industrial site where employees must work in areas of accumulation

- Gulls, House sparrows or European starlings nesting or loafing around a food court area of a recreational facility or other site where humans eat in close proximity to concentrated numbers of these birds.

- Gulls depositing waste from landfills in urban, suburban and other nearby areas;

Individuals or property owners, requesting assistance with feral domestic pigeon, gulls, geese, House sparrow or European starling problems, are often concerned about potential disease risks, but may be unaware of the types of diseases that can be associated with these birds. In most such situations, BDM is requested because the mess associated with droppings left by concentrations of birds is aesthetically displeasing, and results in continual clean-up costs and a degraded quality of life for residents. Under the proposed action, WS could agree to assist in resolving these types of problems.

Canada Geese aggressively defend their nests, nesting areas, and goslings, and may attack or threaten pets, children, and adults (Smith et al. 1999). Canada goose attacks on people have been documented in Vermont during the nesting season and can result in injuries. Additionally, slipping hazards can be created by the buildup of feces from geese on docks, walkways, and other foot traffic areas, especially near nesting areas where geese spend a considerable amount of time during a concentrated time period (April-May). Geese nesting near roadways create traffic hazards when they cross the roadway or defend a nest site from cars and pedestrians, potentially resulting in accidents and human injuries.

1.3.2 Need for Bird Damage Management at Airports

The threat to human safety from aircraft collisions with wildlife (wildlife strikes) is increasing (Dolbeer 2000, MacKinnon et al. 2001). The risk that birds pose to aircraft is well documented with one of the worst cases occurring in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of European starlings (Terres 1980). Other examples include the following strike reports (Wright 2003):

- American Kestrel. In July, 1996, a B-737 struck a single American kestrel at Nashville International Airport (TN), resulting in a compressor stall and an aborted take-off. The aircraft overran the runway, and one passenger was seriously injured. Four others received minor injuries.

- Brown-Headed Cowbirds. In February, 1973, a Learjet 24 departing Peachtree-Dekalb Airport (Atlanta, GA) struck a flock of brown-headed cowbirds attracted to a nearby trash-transfer station. Engine failure resulted in a crash, and the deaths of 8 people.

- Double-Crested Cormorants. In October, 2002 at Logan International Airport (Boston, MA), a B-767 struck a flock of double-crested cormorants, resulting in an engine shut

down, precautionary landing, and damage to the engine and landing lights. The aircraft was out of service for 3 days, and repairs cost $1.7 million.

- European Starlings. In February, 1999, when a B-757 struck a flock of European starlings at the Cincinnati / Northern Kentucky International Airport and was forced to abort the flight (NTSB 1999). Damages were assessed at more than $500,000 by airport officials (D.T. Little, WS Pers. Comm. 1999).

- Red-Tailed Hawk. In December, 1999 at the Toledo Express Airport (OH), a B-747 struck a red-tailed hawk, resulting in an engine fire and a precautionary landing (aircraft out of service for 84 hours). Cost to repair the aircraft was $1.3 million.

Generally, bird collisions occur when aircraft are near the ground. From 1990-2001, approximately 56% of reported bird strikes to U.S. civil aviation occurred when the aircraft was at an altitude of 100 feet above ground level or less (Cleary et al. 2002). Additionally, 78% occurred under 900 feet above ground level and about 86% occurred under 2,000 feet above ground level (Cleary et al. 2002). From 1990-2001, birds were involved in more than 97% of the reported wildlife strikes to civil aircraft in the USA (Cleary et al. 2002). Nationally, gulls (27% of strikes between 1999 and 2001), doves (13%), raptors (12%), and waterfowl (11%) were the most frequently struck bird groups (Cleary et al. 2002). The cost of wildlife strikes to the civil aviation industry in the U.S. is estimated to be in excess of 534,361 hours/year of aircraft down time and $469.8 million in monetary losses (Cleary et al. 2002).

There are 125 registered airports in Vermont (Personal Communications, VAOT). Included in that number are two commercial air carrier airports (Burlington International and Rutland State), 13 public use (public owned) airports, 6 public use (private owned) airports, 96 private use (private owned) airports, 1 seaplane base, and 10 military heliports (Personal Communications, VAOT). According to the Federal Aviation Administration's National Wildlife Strike Database (Cleary et al. 2002 and online strike database http//www:wildlife-mitigation.tc.faa.gov), during 1990-2002 Burlington International and Rutland State airports reported a total of 43 bird-aircraft collisions to the FAA. These reported strikes involved at least 7 different bird species, with the greatest number of strikes involving the following bird species/species groups: unknown (27 strikes), gulls (3), and rock doves (3). The number of bird strikes actually occurring is likely to be much greater, since an estimated 80% of civil bird strikes go unreported (Cleary et al. 2000).

WS receives requests for assistance regarding bird damage management at civil airports and military airfields in Vermont. These requests are considered serious because of the potential for loss of human life and because damage to aircraft can be extremely expensive. With the implementation of an Integrated BDM program in Vermont, WS could provide direct management and technical assistance at the request of aviation facilities in the State.

1.3.3 Need for Bird Damage Management at Cattle Feeding and Dairy Cattle Facilities

European starlings, House sparrows, and, to a lesser extent, pigeons, often cause damage at cattle feeding facilities and dairies by congregating in large numbers to feed on the grain component of cattle feed. Such feeding activities present disease threats to livestock at these sites. The birds also cause damage by defecating on fences, shade canopies, and other structures, which can accelerate corrosion of metal components and which generally is considered an unsightly nuisance and potential health hazard for the feedlot/dairy operators and their personnel. Gulls cause damage by feeding and defecating on vegetable crops and dairy silage, and leaving droppings at dairies and livestock feed lots. Williams et al. (1977) and Johnston et al. (1979) reported that gulls can transmit salmonella to livestock through droppings and contaminated drinking water.

Contributions of Livestock and Dairies to the VT Economy.
In 2002 agriculture was worth $556 million to the Vermont economy (VTAAFM 2003 website). Sales from milk alone were $400 million. There are about 6,700 farms of which 1,415 are dairy farms. Vermont

has approximately 152,000 dairy cows. Vermont produces more than 2.6 billion pounds of milk annually. Beef is the 2nd largest industry in Vermont accounting for more than $60 million annually.

Scope of Livestock Feed Losses. The problem of starling damage to livestock feed has been documented in France and Great Britain (Feare 1984), and in the United States (Besser et al. 1968). The concentration of larger numbers of cattle eating huge quantities of feed in confined pens results in a tremendous attraction to European starlings, blackbirds and rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves). Diet rations for cattle contain all of the nutrients and fiber that cattle need, and are so thoroughly mixed that cattle are unable to select any single component over others. The basic constituent of most rations is silage and the high energy portion is usually provided as barley, which may be incorporated as whole grain or crushed or ground cereal. While cattle cannot select individual ingredients from that ration, European starlings can and do select the barley, thereby altering the energetic value of the complete diet. The removal of this high energy fraction by European starlings, is believed to reduce milk yields, weight gains, and is economically critical (Feare 1984). Glahn and Otis (1986) reported that starling damage was also associated with proximity to roosts, snow, and freezing temperatures and the number of livestock on feed.

The economic significance of feed losses to European starlings has been demonstrated by Besser et al. (1968) who concluded that the value of losses in feedlots near Denver, Colorado was $84 per 1,000 birds in 1967. Forbes (1995) reported European starlings consume up to 50% of their body weight in feed each day. Glahn and Otis (1981) reported losses of 4.8 kg of pelletized feed consumed per 1,000 bird minutes. Glahn (1983) reported that 25.8% of farms in Tennessee experienced starling depredation problems of which 6.3% experienced considerable economic loss. Williams (1983) estimated seasonal feed losses to five species of blackbirds (primarily brown-headed cowbirds) at one feedlot in south Texas at nearly 140 tons valued at $18,000.

Scope of Livestock Health Problems. Table 1-2 shows a number of diseases that affect livestock have been associated with rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves), European starlings, and House sparrows (Weber 1979). Transmission of diseases such as Transmissible Gastroenteritis Virus (TGE), Tuberculosis (TB), and Coccidiosis to livestock has been linked to migratory flocks of European starlings. Estimates of the dollar value of this type of damage are not available. A consulting veterinarian for a large cattle feeding facility in Texas indicated problems associated with coccidiosis declined following reduction of starling numbers using the facility (R. Smith, WS, Canyon District, TX, Pers. Comm.). Williams et al. (1977) and Johnston et al. (1979) reported that gulls can transmit salmonella to livestock through droppings and contaminated drinking water.

Table 1-2. Diseases of livestock that have been linked to rock pigeons (also commonly referred to as feral domestic pigeons, or rock doves), European starlings, and/or House sparrows. Information from Weber (1979).

Disease	Livestock affected	Symptoms	Comments
Bacterial:			
Erysipeloid	cattle, swine, horses, sheep, goats, chickens, turkeys, ducks	Pigs - arthritis, skin lesions, necrosis, septicemia Sheep - lameness	serious hazard for the swine industry, rejection of swine meat at slaughter due to speticemia, also affects dogs
Salmonellosis	all domestic animals	abortions in mature cattle, mortality in calves, decrease in milk	over 1700 serotypes

		production in dairy cattle Colitis in pigs,	
Pasteurellosis	cattle, swine, horses, rabbits, chickens, turkeys	Chickens and turkeys die suddenly without illness pneumonia, bovine mastitis, abortions in swine, septicemia, abscesses	also affects cats and dogs
Avian Tuberculosis	chickens, turkeys, swine, cattle, horses, sheep	Emaciation, decrease in egg production, and death in poultry. Mastitis in cattle	also affects dogs and cats
Streptococcosis	cattle, swine, sheep, horses, chickens, turkeys, geese, ducks, rabbits	Emaciation and death in poultry. Mastitis in cattle, abscesses and inflamation of the heart , and death in swine	feral pigeons are susceptible and aid in transmission
Yersinosis	cattle, sheep, goats, horses, turkeys, chickens, ducks	abortion in sheep and cattle	also affects dogs and cats
Vibriosis	cattle and sheep	In cattle, often a cause of infertility or early embryonic death. In sheep, the only known cause of infectious abortion in late pregnancy	of great economic importance
Listeriosis	Chickens, ducks, geese, cattle, horses, swine, sheep, goats	In cattle, sheep, and goats, difficulty swallowing, nasal discharge, paralysis of throat and facial muscles	also affects cats and dogs
Viral:			
Meningitis	cattle, sheep, swine, poultry	inflamation of the brain, newborn calves unable to suckle	associated with listeriosis, salmonellosis, cryptococcosis
Disease	**Livestock Affected**	**Symptoms**	**Comments**
Encephalitis (7 forms)	horses, turkeys, ducks	drowsiness, inflamation of the brain	mosquitoes serve as vectors
Mycotic (fungal):			
Aspergillosis	cattle, chickens, turkeys, and ducks	abortions in cattle	common in turkey poults
Blastomycosis	weight loss, fever, cough, bloody sputum and chest pains.	Rarely	affects horses, dogs and cats
Candidiasis	cattle, swine, sheep, horses, chickens, turkeys	In cattle, mastitis, diarrhea, vaginal discharge, and aborted fetuses	causes unsatisfactory growth in chickens
Cryptococcosis	cattle, swine, horses	chronic mastitis in cattle, decreased milk flow and	also affects dogs and cats

		appetite loss	
Histoplasmosis	horses cattle and swine	(in dogs) chronic cough, loss of appetite, weakness, depression, diarrhea, extreme weight loss	also affects dogs; actively grows and multiplies in soil and remains active long after birds have departed
Coccidiosis	poultry, cattle, and sheep	bloody diarrhea in chickens, dehydration, retardation of growth	almost always present in House sparrows; also found in pigeons and European starlings
Protozoal:			
American Trypanosomiasis	infection of mucous membranes of eyes or nose, swelling	possible death in 2-4 weeks	caused by the conenose bug found on pigeons
Toxoplasmosis	cattle, swine, horses, sheep, chickens, turkeys	In cattle, muscular tremors, coughing, sneezing, nasal discharge, frothing at the mouth, prostration and abortion	also affects dogs and cats
Rickettsial/ Chlamydial:			
Chlamydiosis	cattle, horses, swine, sheep, goats, chickens, turkeys, ducks, geese	In cattle, abortion, arthritis, conjunctivitis, enteritis	also affects dogs and cats and many wild birds and mammals
Q Fever	affects cattle, sheep, goats, and poultry	may cause abortions in sheep and goats	can be transmitted by infected ticks

1.3.4 Need for Bird Damage Management Related to Other Agricultural Resources

Several studies have shown that European starlings can pose a great economic threat to agricultural producers (Besser et. al. 1968, Dolbeer et.al. 1978, and Feare 1984). Fruit and nut crops can be damaged by blackbirds, American crows, gulls, and other birds. Gulls cause damage by feeding and defecating on vegetable crops. Starlings and sparrows can also have a detrimental impact on agricultural food production by feeding at vineyards, orchards, gardens, crops, and feedlots (Weber 1979). For example, starlings feed on numerous types of fruits such as, cherries, figs, blueberries, apples, apricots, grapes, nectarines, peaches, plums, persimmons, strawberries, and olives (Weber 1979). Starlings were also recently found to damage ripening corn (Johnson and Glahn 1994) and are known to feed on the green, milk and dough stage kernels of sorghum (Weber 1979). Additionally, starlings may pull sprouting grains, especially winter wheat, and feed on planted seed (Johnson and Glahn 1994). Sparrows damage crops by pecking seeds, seedlings, buds, flowers, vegetables, and maturing fruits (Fitzwater 1994), and localized damage can be great because sparrows often feed in large flocks on a small area (Fitzwater 1994).

Canada geese graze a variety of crops, including alfalfa, barley, beans, corn, soybeans, wheat, rye, oats, spinach, and peanuts (Atlantic Flyway Council 1999). A single intense grazing event by Canada geese in fall, winter or spring can reduce the yield of winter wheat by 16-30% (Fledger et al. 1987), and reduce growth of rye plants by >40% (Conover 1988). However, some have reported that grazing by geese during the winter may increase rye or wheat seed yields (Clark and Jarvis 1978, Allen et al. 1985). The most common Canada goose damage to agricultural resources in Vermont is depredation on field corn, alfalfa, rye and wheat. Damage is primarily consumption (and loss of the crop and revenue), but also consists of unacceptable accumulations of feces on pastures, trampling of crops, and increased erosion and runoff from fields where the cover crop has been grazed.

There are four major fruit and berry crops grown in VT: apples, strawberries, raspberries and blueberries. Total value of fruits, berries and vegetable crops grown in VT is $23 million annually (VAAFM website 2003). Total production of apples during 2001 amounted to 29 million pounds, with the value of production estimated at $8.9 million (New England Agriculture Statistics Service). The value of berry production in 2001 was $3.8 million. In Vermont, bird damage to agricultural resources reported to WS includes, but is not limited to the following (1) American crow damage to field corn, (2) American crow damage to cucumbers, (3) Canada geese damage to rye, wheat and alfalfa, (4) Snow geese damage to clover, rye, wheat and alfalfa, (5) rock dove damage to field corn and other grains (6) European starling damage to field corn, sweet corn, and other grains and (7) wild turkey damage to grapes, strawberries, field corn and other grains. These and other wildlife damage problems were reported to USFWS during FY 2002 by VT farmers on their applications for Federal depredation permits to take migratory birds.

1.3.5 Need for BDM to Protect Aquaculture and Fishery Resources

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 the sport fishery population (USFWS 2003b). Cormorants can have a negative impact on recreational fishing on a localized level (USFWS 2003b). Recreational fishing benefits local and regional economies in many areas of the U.S., with some local economies relying heavily on income associated with recreational fisheries (USFWS 2003). The degree of the effects of DCCO predation on fish 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). Environmental and human-induced factors affect aquatic ecosystems as well. These can be classified as biological/biotic (overexploitation, exotic species, etc.), chemical (water quality, nutrient and contaminant loading, etc.) or physical/abiotic (dredging, dam construction, hydropower operation, siltation, etc.). 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).

Aquaculture, the cultivation of finfish and invertebrates in captivity, has grown exponentially in the past several decades. Double-crested cormorants can feed heavily on small fish being raised commercially on minnow farms for bait, or for human consumption at fish farms or aquaculture sites (USFWS 2003b). In Vermont, there are five state operated and two federal fish hatcheries and nine private and commercial fish hatcheries. The VTDEC Wastewater Management Division requires permits for facilities to discharge water into Vermont waters. It is possible that gulls and cormorants function as vectors for the spread of disease at aquaculture facilities. The threat of disease transmission through gulls and cormorants is unknown at this time, but there remains a need to protect fishery resources from this possibility (Phil Hulbert, NYSDEC, Pers. Comm. 2003).

1.3.6 Need for Bird Damage Management to Protect Property

Birds frequently damage structures on private property or public facilities with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). Corrosion damage to metal structures and painted finishes, including those on automobiles, can occur because of uric acid from bird droppings. Electrical utility companies frequently have problems with birds causing power outages by shorting out transformers and substations. Persons and businesses concerned about these types of damage may request WS assistance.

Pigeons, starlings, sparrows and other nesting and roosting birds cause damage to aircraft in hangars. Accumulation of feces on airplanes, helicopters, maintenance equipment, and hangar floors results in unscheduled maintenance to clean planes and buildings to protect painted surfaces from acidic fecal droppings and maintain a sanitary work environment. Furthermore, birds may build nests in engines of idle aircraft which may cause engine damage or cause a fire.

Roof-top colonies of nesting gulls have been well documented and frequently cause damage to urban and suburban structures. Gulls transport large amounts of nest material and food remains to the roof-tops which can obstruct roof drainage systems and lead to structural damage to buildings (Vermeer et al. 1988, Blokpoel and Scharf 1991, Belant 1993).

Gull attraction to landfills as a food source has been well documented (Mudge and Ferns 1982, Patton 1988, Belant et al. 1995a, 1998, Gabrey 1997). Large numbers of gulls are attracted to and use landfills as feeding and loafing areas throughout North America. In the northeastern United States, landfills often serve as foraging and loafing areas for gulls throughout the year, while attracting larger populations of gulls during migration periods (Bruleigh 1998). Landfills have even been suggested as contributing to the increase in gull populations (Verbeek 1977, Patton 1988, Belant and Dolbeer 1993). Gulls that visit landfills may loaf and nest on nearby rooftops, causing health concerns and structural damage to buildings and equipment. Bird conflicts associated with landfills include accumulation of feces on equipment and buildings, distraction of heavy machinery operators, and the potential for birds to transmit disease to workers on the site. The tendency for gulls to carry waste off site results in accumulation of feces and deposition of garbage on surrounding industrial and residential areas which creates a nuisance, as well as generates the potential for birds to transmit disease to neighboring residents.

Property losses associated with cormorants include impacts to privately-owned lakes that are stocked with fish; damage to boats and marinas or other properties found near cormorant breeding or roosting sites; and damage to vegetation on privately-owned land (USFWS 2003).

Geese may cause damage to aircraft, automobiles, landscaping, piers, yards, boats, beaches, shorelines, parks, golf courses, landscaping, driveways, athletic fields, ponds, lakes, rafts, porches, patios, gardens, foot paths, swimming pools, play grounds, school grounds, and cemeteries. Damage reported through technical assistance generally is not verified by field investigation by WS. The majority of people that

contact WS for assistance describe a general decline in their quality of life due to local overabundance of geese. In many cases, people are unable to use and enjoy their own property, public parks, and other areas because of goose feces.

Costs associated with property damage include labor and disinfectants to clean and sanitize the area, loss of property use and resale value, loss of aesthetic value of plants, gardens, aquatic vegetation, and lawns where geese feed and loaf, loss of customers or visitors irritated by having to walk on feces, and loss of time contacting wildlife management agencies on health and safety issues and damage management advice, and implementation of nonlethal and lethal wildlife management methods. The costs of reestablishing overgrazed lawns and cleaning goose feces from sidewalks have been estimated at more than $60 per bird (Allan et at. 1995).

In VT, bird damage to property includes, but is not limited to: European starling feces damage to barns and equipment, cattle and human health and safety, waterfowl damage to lawns, golf courses, recreational facilities and other property; and bird feces, feathers and other damage to property associated with roosts.

1.3.7 Need for Bird Damage Management to Protect Natural Resources

Some of the species listed as threatened or endangered under the Endangered Species Act of 1973 are preyed upon or otherwise adversely affected by certain bird species.

Double-crested cormorants are known to have a negative impact on wetland habitats (Jarvie et al. 1999, Shieldcastle and Martin 1999) and wildlife, including threatened and endangered species (Korfanty et al. 1999). Concentrations of gulls often impact the productivity and survivorship of rare or endangered colonial species such as terns (USDI 1996) and prey upon the chicks of colonial waterbirds. Some examples of WS assistance with protecting endangered species include protection of piping plover nests from gulls in New Jersey (J. Bucknall, WS, Pers. Comm. 2001), protection of adult and least terns and snowy plovers in California from predation by gulls, terns, ravens, and raptors (J. Turman, M. Jensen, WS, Pers. Comm. 2001), and the protection of juvenile salmonids (steelhead and salmon) in Washington from heron, gull, tern, and cormorant predation (K. Gruver, WS, Pers. Comm. 2001).

Double-crested cormorants can displace colonial species such as black-crowned night herons, egrets, great blue herons, gulls, common terns, and Caspian terns through habitat degradation and nest site competition (USFWS 2003b). Cuthbert et al. (2002) examined potential impacts of DCCOs on great blue herons and black-crowned night-herons in the Great Lakes and found that DCCOs have not negatively influenced breeding distribution or productivity of either species at a regional scale, but did contribute to declines in heron presence or site abandonment in certain site specific circumstances. Furthermore, Cuthbert et al. (2002) did find that DCCOs have negative impacts on normal plant growth and survival on a localized level in the Great Lakes region. 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 egret, snowy egret, black duck, mallard, common goldeneye, common merganser, tree swallow, red-winged blackbird, common grackle, green-backed heron, great blue heron, wood duck and gadwall on mainly through the degradation of habitat and competition for nest sites (J. Gobeille, VTFWD personal communication). Accumulation of cormorant droppings (which contribute excessive ammonium nitrogen), stripping leaves for nesting material, and the combined weight of the birds and their nests can break branches and ultimately kill many trees within 3 to 10 years (Bedard et al. 1995, Korfanty et al. 1999, Lemmon et al. 1994, Lewis 1929, Weseloh et al.1995, Weseloh and Ewins 1994, Weseloh and Collier 1995). Lewis (1929) considers the killing of trees by nesting cormorants to be very local and limited, with most trees he observed to have no commercial timber value. However, tree damage may be perceived as a problem if these trees are rare species, or aesthetically valued (Hatch and Weseloh 1999).

Interspecific nest competition has been well documented in European starlings. Miller (1975) and Barnes (1991) reported European starlings were responsible for a severe depletion of the eastern bluebird (*Sialis sialis*) population due to nest competition. Nest competition by European starlings has also been known to

adversely impact American kestrels (sparrow hawks) (Von Jarchow 1943, Nickell 1967, and Wilmer 1987), red-bellied woodpeckers (*Centurus carolinus*), Gila woodpeckers (Centurus uropygial is) (Kerpez and Smith 1990 and Ingold 1994), and wood ducks (*Aix sponsa*) (Shake 1967, McGilvery and Uhler 1971, Heusmann et.al. 1977, and Grabill 1977). Weitzel (1988) reported nine native species of birds in Nevada had been displaced by starling nest competition, and Mason et al. (1972) reported European starlings evicting bats from nest holes.

Nutrient loading has been found to increase in wetlands in proportion to increases in the numbers of roosting geese (Kitchell et al. 1999, Manny et al. 1994). In studying the relationship between bird density and phosphorus (P) and nitrogen (N) levels in Bosque del Apache National Wildlife Refuge in New Mexico, Kitchell et al. (1999) found an increase in the concentration of both P and N correlated with an increase in bird density. Scherer et al. (undated) stated that waterfowl metabolize food very rapidly and most of the phosphorus contributed by bird feces probably originates from sources within a lake being studied. In addition, assimilation and defecation converted the phosphorus into a more soluble form and, therefore was considered a form of internal loading. Waterfowl have contributed substantial amounts of P and N into lakes through feces creating excessive aquatic macrophyte growth and algae blooms (Scherer et al. undated) and accelerated eutrophication through nutrient loading (Harris et al. 1981).

Soil erosion and sedimentation can cause damage to natural resources. Excessive numbers of waterfowl can remove or trample bank vegetation resulting in erosion of the shoreline and soil sediments being carried by rainwater into lakes, ponds and reservoirs. Waterfowl may cause damage to natural vegetation, shorelines, parks, ponds, and lakes.

Waterfowl are considered by the American Association of Wildlife Veterinarians (AAWV) as susceptible to and carriers of disease and parasites. Because of the potential threat to free-ranging waterfowl, the AAWV put forth the following resolution (AAWV, undated):

> ...wild and semi-domestic ducks, geese and swans are susceptible to and carriers of disease and parasites of free-ranging wild ducks, geese, and other birds;..."
>
> ...the AAWV encourages local authorities and state and federal agencies to cooperate to limit the population of waterfowl on urban water areas to prevent disease outbreaks in semidomestic as well as free ranging ducks, geese and swans and discourages the practice of relocating nuisance or excess urban ducks, geese and swans to other parks or wildlife areas as a means of local population control."

1.4 RELATIONSHIP TO OTHER ENVIRONMENTAL DOCUMENTS

ADC Programmatic Environmental Impact Statement. WS, previously called Animal Damage Control (ADC), has issued a Final EIS on the national APHIS/WS program (USDA 1997). Pertinent and current information available in the EIS has been incorporated by reference into this EA.

Final Environmental Impact Statement: Double-crested Cormorant Management in the United States. The USFWS has issued a Final EIS (FEIS) and Record of Decision (ROD) (68 Federal Register 58022) on the management of double-crested cormorants (USFWS 2003). WS was a formal cooperating agency in the preparation of the FEIS and has adopted the EIS to support WS' program decisions for its involvement in the management of DCCO damage. WS completed a ROD on November 18, 2003 (68 Federal Register 68020). This EA is tiered to that FEIS. Pertinent and current information available in the EIS has been incorporated by reference into this EA. The FEIS may be obtained by contacting the Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, MBSP-4107, Arlington, Virginia 22203 or by downloading it from the USFWS website at: http://migratorybirds.USFWS.gov/issues/cormorant/cormorant.html. WS ROD may be viewed at http://www.aphis.usda.gov/ws/pubs.html.

1.5 WS RECORD KEEPING REGARDING REQUESTS FOR BIRD DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from Wildlife Services. It does not include requests received or responded to by local, State or other Federal agencies, and it is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exists.

The database includes, but is not limited to, the following information: species of wildlife involved, the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 1-3 provides a summary of Technical Assistance requests to the Vermont WS program for Fiscal Years 1997-2002. A description of the WS Direct Control and Technical Assistance programs is contained in Chapter 3 of this EA.

Table 1-3*. Annual number of requests for technical assistance involving birds to Vermont Wildlife Services during 1997-2002.

Fiscal Year	Agriculture	Human Health and Safety	Property	Natural Resources	Total
1997	20	22	68	0	110
1998	17	16	103	0	136
1999	6	7	89	3	105
2000	18	298	93	3	412
2001	22	390	80	2	494
2002	58	1,033	92	8	1,191
* Total	141	1,766	525	16	2,448

Data presented in this table were taken from the VT WS Management Information System (MIS).

1.6 PROPOSED ACTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to bird damage in the State of Vermont. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce bird damage to property, agricultural resources (including livestock), natural resources, and human/public health and safety. Damage management would be conducted on public and private property in Vermont when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using shooting, trapping, egg addling/destruction, nest destruction, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy.

Bird damage management activities would be conducted in the State, when requested and funded, on private or public property, including airport facilities and adjacent or nearby properties, after an *Agreement for Control* or

other comparable document has been completed. All management activities would comply with appropriate Federal, State, and Local laws, including applicable laws and regulations authorizing take of birds, and their nest and eggs.

1.7 DECISION TO BE MADE

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

- Should WS implement an integrated bird damage management strategy, including technical assistance and direct control, to meet the need for bird damage management in Vermont?
- If not, should WS attempt to implement one of the alternatives to an integrated bird damage management strategy as described in the EA?
- Would the proposed action have significant impacts on the quality of the human environment, requiring preparation of an EIS?

1.8 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.8.1 Actions Analyzed

This EA evaluates bird damage management by WS to protect: 1) property; 2) agricultural resources; 3) natural resources; 4) livestock and dairies; and 5) public health and safety in Vermont. Protection of other resources or other program activities would be addressed in other NEPA analysis, as appropriate.

1.8.2 American Indian Lands and Tribes

Currently, Vermont WS does not have any MOUs with any American Indian tribes. If WS enters into an agreement with a tribe for BDM, this EA would be reviewed and supplemented, if appropriate, to insure compliance with NEPA. MOUs, agreements and NEPA documentation would be prepared as appropriate before conducting BDM on tribal lands.

1.8.3 Period for which this EA is Valid

This EA would remain valid until the WS program in Vermont and other appropriate agencies determine that new needs for action, changed conditions or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document would be supplemented pursuant to NEPA. Review of the EA would be conducted each year to ensure that the EA is sufficient.

1.8.4 Site Specificity

This EA analyzes the potential impacts of BDM and addresses activities on all lands in Vermont under MOUs, Cooperative Agreements and in cooperation with the appropriate public land management agencies. It also addresses the impacts of BDM on areas where additional agreements may be signed in the future. Because the proposed action is to reduce damage and because the program's goals and directives are to provide services when requested, within the constraints of available funding and workforce, it is conceivable that additional BDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such efforts as part of the program.

Planning for the management of bird 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, insurance companies, etc. 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) would be the site-specific procedure for individual actions conducted by WS in Vermont (see Chapter 3 for a description of the Decision Model and its application).

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

1.8.5 Summary of Public Involvement

Issues related to the proposed action were initially developed by WS. Issues were defined and preliminary alternatives were identified. As part of this process, and as required by the Council on Environmental Quality (CEQ 1981) and APHIS-NEPA implementing regulations, this document and its Decision are being made available to the public through "Notices of Availability" (NOA) published in local media and through direct mailings of NOA to parties that have specifically requested to be notified. New issues or alternatives raised after publication of public notices will be fully considered to determine whether the EA and its Decision should be revisited and, if appropriate, revised.

1.9 PREVIEW OF THE REMAINDER OF THIS EA

The remainder of this EA is composed of four (4) chapters and five (5) appendices. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, mitigation, and standard operating procedures (SOP). Chapter 4 analyzes environmental consequences and the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers and those consulted during this EA process. Appendix A is a list of the literature cited during the preparation of the EA and Appendix B is a detailed description of the methods used for BDM in Vermont. Appendices C-E are comprehensive lists of Federal and VT T&E species and correspondence with the USFWS regarding T&E species.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.0 INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that received detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues used to develop mitigation measures and SOPs, and issues not considered in detail, with the rationale. Pertinent portions of the affected environment are included in this chapter and in the discussion of issues used to develop mitigation measures. Additional affected environments are incorporated into the discussion of the environmental impacts in Chapter 4 and the description of the proposed program in Chapter 3.

2.1 AFFECTED ENVIRONMENT

The proposed action may be conducted on properties held in private, local, state or federal ownership. The areas of the proposed action could include areas in and around commercial, industrial, public, and private buildings, facilities and properties and at other sites where birds may roost, loaf, feed, nest or otherwise occur. Examples of areas where wildlife damage management activities could be conducted are, but are not necessarily limited to: agricultural fields, vineyards, orchards, farmyards, dairies, ranches, livestock operations, grain mills, grain handling areas, railroad yards, waste handling facilities, bridges, industrial sites, natural areas, government properties and facilities, private homes and properties, corporate properties, schools, hospitals, cemeteries, parks and recreation areas (including sports fields, playgrounds, swimming pools, etc.), swimming lakes, communally-owned homeowner/property owner association properties, natural areas, wildlife refuges, wildlife management areas, coastal and tidal beaches, ponds, rivers, and inlets, airports and surrounding areas. In addition, there are currently 5 historic breeding sites in Vermont (Wires et al. 2001) on which WS may conduct double-crested cormorant control activities. [redacted] Of these 5 breeding sites, 2 are privately owned and 3 are publicly owned (Young Island, Mud Island and Shad Island).

2.2 ISSUES ANALYZED IN DETAIL IN CHAPTER 4

The following issues have been identified as areas of concern requiring consideration in this EA. These will be analyzed in detail in Chapter 4:

- Effects on target bird species
- Effects on other wildlife species, including T&E species
- Effects on human health and safety
- Impacts to stakeholders, including aesthetics
- Humaneness and animal welfare concerns of methods used

2.2.1 Effects on Target Bird Species

Of interest to WS, program recipients, decision-makers, and members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA include, but are not necessarily limited to feral pigeon (*Columbia livia*), European starling (*Sturnus vulgaris*), House sparrow (*Passer domesticus)*, herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), greater black-backed gull (*Larus marinus*), double-crested cormorant (*Phalacrocorax auritus*), Canada goose (*Branta canadensis*), snow goose (*Chen caerulescens*), mallard duck (*Anas platyrhynchos*), domestic waterfowl (ducks and geese), red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), common grackle (*Quiscalus quiscula*), American crow (*Corvus brachyrhynchos*), turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), killdeer (*Charadrius vociferus*), wild turkey (*Meleagris gallopavo*), snow bunting (*Plectrophenax nivalis*), great blue heron (*Ardea herodias*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides*

villosus), pileated woodpecker (*Dryocopus pileatus*), Great Horned Owl (*Bubo virginianus*), Barred Owl (*Strix varia*), rough-legged hawk (*Buteo lagopus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), broad-winged hawk (*Buteo platypterus*) , red-shouldered hawk (*Buteo lineatus*), Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), Northern goshawk (*Accipiter gentilis*), Northern saw-whet owl (*Aegolius acadicus*), long-eared owl (*Asio otus*), common barn owl (*Tyto alba*), and Eastern screech owl (*Otus asio*).

Impacts of West Nile virus on bird populations. West Nile (WN) virus has emerged in recent years in temperate regions of North America, with the first appearance of the virus in North America occurring in New York City in 1999 (MMWR 2002, Rappole et al. 2000). Since 1999 the virus has spread across the United States and was reported to occur in 44 states and the District of Columbia in 2002 (MMWR 2002). West Nile virus is typically transmitted between birds and mosquitoes. Mammals can become infected if bitten by an infected mosquito, but individuals in most species of mammals do not become ill from the virus. The most serious manifestation of the WN virus is fatal encephalitis in humans, horses, and birds. West Nile virus has been detected in dead bird species of at least 138 species (CDC 2003). Although birds infected with WN virus can die or become ill, most infected birds do survive and may subsequently develop immunity to the virus (CDC 2003, Cornell University 2003). In some bird species, particularly Corvids (crows, blue jays, ravens, magpies), the virus causes disease (often fatal) in a large percentage of infected birds (Audubon 2003, CDC 2003, Cornell University 2003, MMWR 2002). In 2002, WN virus surveillance/monitoring programs revealed that Corvids accounted for 90% of the dead birds reported with crows representing the highest rate of infection (MMWR 2002). Large birds that live and die near humans (i.e. crows) have a greater likelihood of being discovered, therefore the reporting rates tend to be higher for these bird species and are a "good indicator" species for the presence of WV virus in a specific area (Cornell University 2003, Audubon 2003). According to US Geological Survey (USGS), National Wildlife Health Center (2003), information is not currently available to know whether or not WN virus is having an impact on bird populations in North America. USGS states that it is not unusual for a new disease to cause high rates of infection or death because birds do not have the natural immunity to the infection. Furthermore, it is not known how long it will take for specific bird population to develop sufficient immunity to the virus. Surveys of wild birds completed in the last three years have shown that some birds have already acquired antibodies to the virus (USGS-WHC 2003). Based upon available Christmas Bird Counts and Breeding Bird Surveys, USGS-WHC (2003) states that there have been declines in observations of many local bird populations, however they do not know if the decline can be attributed to WN virus or to some other cause. A review of available crow population data by Audubon (2003) reveals that at least some local crow populations are suffering high WN virus related mortality, but crow numbers do not appear to be declining drastically across broad geographic areas. USGS does not anticipate that the commonly seen species, such as crows and blue jays, will be adversely affected by the virus to the point that these bird species will disappear from the U.S. (USGS-WHC 2003).

2.2.2 Effects on Other Wildlife Species, including T&E Species

WS and the rest of the wildlife management profession, as well as the public, are concerned about whether the proposed action or any of the alternatives might result in adverse impacts to populations of other wildlife, especially T&E species. WS' mitigation measures and SOPs are designed to reduce the effects on non-target species' populations and are presented in Chapter 3. To reduce the risks of adverse affects to non-target species, WS would select damage management methods that are target-selective or apply such methods in ways to reduce the likelihood of capturing or killing non-target species.

Threatened and Endangered (T&E) species lists for the USFWS and State of Vermont were reviewed to identify potential effects on federal and state listed T&E species. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the ESA concerning potential effects of BDM methods on T&E species and has obtained a Biological Opinion (B.O.). For the full context of the B.O., see Appendix F of the ADC FEIS (USDA 1997). WS is also in the

process of reinitiating Section 7 consultation at the program level to assure that potential effects on T&E species have been adequately addressed.

As part of the cormorant FEIS (USFWS 2003b), the USFWS completed an intra-Service biological evaluation and informal Section 7 consultation on the management of double-crested cormorants in the U.S. As stated in WS cormorant ROD (68 Federal Register 68020), applicable conservation measures identified in the FEIS have been incorporated into the Vermont WS' program (see Section 4.1.2).

WS also consulted with the USFWS New England Field Office under Section 7 during this EA process, to ensure that potential effects on T&E species were adequately addressed (correspondence in Appendix D).

Some members of the public are concerned that the use of registered toxicants to reduce bird damage would have adverse impacts on other wildlife species, including T&E species. Under the alternatives proposed in this EA, the primary toxicant proposed for use by WS is DRC-1339, which would be used to remove starlings, pigeons, and gulls in damage situations.

Starlicide®, a pesticide similar to DRC-1339, is not currently registered for use in Vermont, may be considered for use if it becomes registered in Vermont in the future. As part of the planning process, analysis of potential impacts of this toxicant are being addressed in this EA to determine potential impacts if and when Starlicide® becomes registered for use in VT.

Avitrol® is classified as an avian distressing agent and is normally used to deter target bird species from using certain problem areas.

Other chemicals available for BDM use in Vermont include the tranquilizer Alpha-chloralose (for live-capturing pigeons, waterfowl and others birds), methyl anthranilate (artificial grape flavoring, which also has bird repellent capabilities, sold commercially as ReJeX-iT Crop Guardian Bird Repellent®), 4 the Birds Transparent Bird Repellent Liquid, Transparent 4 The Birds Repellent, Transparent Bird Gel Repellent, Bird Repellent (Tanglefoot)®, Hot Foot Bird Repellent, and Rid A Critter Rabbit & Squirrel Repellent.

Appendix B contains detailed descriptions of these chemicals and their potential effects.

2.2.3 Effects on Human Health and Safety

A common concern is whether the proposed action or any of the alternatives pose an increased threat to human health and safety. In particular, there is concern that the lethal methods of bird removal (i.e., pesticide application and shooting) may be hazardous to people and pets, or that continued increases in bird populations might threaten public health or safety. Formal risk assessment (USDA 1997, Appendix P) has shown that there are no probable risks to public health and safety in Vermont from bird damage management methods.

Safety and efficacy of chemical control methods.

Some individuals may have concerns that chemicals used for wildlife damage management should not be used because of potential adverse effects on people from being exposed to the chemicals directly or to the animals that have died as a result of the chemical use. Under the alternatives proposed in this EA, one of the toxicants proposed for use by WS is DRC-1339, which would be primarily used to remove starlings, pigeons, and gulls in damage situations. The EPA through FIFRA regulates DRC-1339 use, by VTPID and VT state law (V.S.A. Title 6 Chapter 87 Sections I-XIII, and by WS Directives. Starlicide®, a pesticide similar to DRC-1339, is not currently registered for use in Vermont, may also be considered for use if it becomes registered in Vermont in the future.

The chemical bird repellent methyl anthranilate (Rejex-it®, etc.) could be used to reduce feeding activity on airfields and other turf areas. Both methyl anthranilate and anthraquinone are non-lethal, and work by causing a negative response to feeding in the treated area. Another chemical method that could be used is Avitrol®, which is classified as a chemical frightening agent and is normally used to avert certain bird species from using certain problem areas. The avian tranquilizer Alpha-Chloralose could be used for live-capturing pigeons, waterfowl and other birds.

The use of registered chemical toxicants and repellants for bird damage management poses no risk to public health and safety when applied according to label instructions. WS personnel who apply pesticides are certified pesticide applicators and apply pesticides according to label instructions. A detailed description of these chemicals and their potential effects is contained in Appendix B.

Impacts on human safety of non-chemical BDM methods

Some people may be concerned that WS's use of firearms, traps, and pyrotechnic scaring devices could cause injuries to people. WS personnel occasionally use traps, small caliber firearms, air guns (air rifles and air pistols), and shotguns to remove or scare birds that are causing damage. Shotguns may also be used on airports to scare or remove birds which pose a threat to aircraft or air passenger safety. WS frequently uses pyrotechnics in noise harassment programs to disperse or move birds. There is some potential fire hazard to agricultural sites and private property from pyrotechnic use.

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

Impacts on human health and safety from birds

The concern stated here is that the absence of adequate BDM would result in adverse effects on human health and safety, because bird damage would not be curtailed or reduced to the minimum levels possible and practical. The potential impacts of not conducting such work could lead to increased incidence of injuries, illness, or loss of human lives.

Property managers fear that the absence of WS BDM activities would lead to accumulation of gull droppings and feathers near rooftop ventilation systems which may increase the risk of disease transmission to humans. Building maintenance workers are also at risk for being attacked by gulls nesting on rooftops.

WS assists airport management who seek to resolve wildlife hazards to aviation. Airport managers and air safety officials are concerned that the absence of a WS BDM program could lead to a failure to adequately address complex wildlife hazard problems faced by the aviation community. Hence, potential effects of not conducting such work could lead to an increased incidence of human injuries or loss of life due to bird strikes to aircraft.

2.2.4 Impacts to Stakeholders, including Aesthetics

Aesthetics is a philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is subjective in nature and is dependent on what an observer regards as beautiful.
The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception, and today a large percentage of households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to reduce conflicts/problems between humans and wildlife.

There may be some concern that the proposed action or alternatives would result in the loss of aesthetic benefits to the public, resource owners, or neighboring residents. Wildlife generally is regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people.

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

Many people, directly affected by problems and threats to public health or safety associated with birds, insist upon their removal from the property or public location when they cause damage. Some members of the public have an idealistic view and believe that all wildlife should be captured and relocated to another area to alleviate damage or threats to public health or safety. Others, directly affected by the problems caused by wildlife, strongly support removal. Individuals not directly affected by the harm or damage caused by wildlife may be supportive, neutral, or totally opposed to any removal of wildlife from specific locations or sites. Those totally opposed to bird damage management want WS to teach tolerance for damage and threats to public health or safety, and that wildlife should never be killed. Some people would strongly oppose removal of birds regardless of the amount and type of damage. Some members of the public who oppose removal of wildlife do so because of human-affectionate bonds with individual wildlife. These human-affectionate bonds are similar to attitudes of a pet owner and result in aesthetic enjoyment.

The WS program in Vermont only conducts wildlife damage management at the request of the affected property owner or resource manager. If WS received requests from an individual or official for BDM, WS would address the issues/concerns and consideration would be made to explain the reasons why the individual damage management actions would be necessary. Management actions would be carried out in a caring, humane, and professional manner.

2.2.5 Humaneness and Animal Welfare Concerns of Methods Used

Humaneness, in part, is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently.

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare concerns, if "... *the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process.*" Suffering is described as a "... *highly unpleasant emotional response usually associated with pain and distress.*" However, suffering "... *can occur without pain* ...," and "... *pain can occur without suffering* ... " (AVMA 1987). Because suffering carries with it the implication of a time frame, a case could be made for "... *little or no suffering where death comes immediately* ... " (CDFG 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "... *probably be causes for pain in other animals* ... " (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991). One challenge with coping with this issue is how to achieve the least amount of animal suffering within the constraints of current technology and resources.

WS has improved the selectivity and humaneness of management techniques through research and development. Research is continuing to bring new findings and products into practical use. Until new findings and products are found practical, a certain amount of animal suffering could occur when some BDM methods are used in situations where non-lethal damage management methods are not practical or effective.

Vermont WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, and available personnel and financial resources. Mitigation measures and standard operating procedures used to maximize humaneness are described in Chapter 3.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.3.1 No Wildlife Damage Management at Taxpayer Expense; Wildlife Damage Management should be Fee Based

Funding for WS comes from a variety of sources in addition to federal appropriations. In Vermont, funds to implement wildlife damage management activities and programs are derived from a number of sources, including, but not limited to Federal, state, county and municipal governments/agencies, private organizations, corporations and individuals, homeowner/property owner associations, and others, under Cooperative Service Agreements and/or other contract documents and processes. Federal, state, and local officials have decided that wildlife damage management should be conducted by appropriating funds. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Wildlife damage management is an appropriate sphere of activity for government programs, since aspects of wildlife damage management are a government responsibility and authorized and directed by law.

2.3.2 Bird Damage should be Managed by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce bird damage for property owners or property owners could attempt to reduce their own damage problems. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues and reduced administrative burden. Additionally, use of the pesticide

DRC-1339 may be the most effective damage management method in some situations, either used alone or as part of an IWDM program. This avicide is registered only for use by WS and is not available to private nuisance wildlife control agents or property owners. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators if it becomes registered for use in the state.

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

Some individuals might question whether preparing an EA for an area the size of the State of Vermont would meet the NEPA requirements for site specificity. If in fact a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire State may provide a better analysis than multiple EAs covering smaller zones. In addition, the WS program in Vermont only conducts BDM on a relatively small area of the State where damage is occurring or likely to occur.

2.3.4 Wildlife Damage is a Cost of Doing Business — a "Threshold of Loss" Should Be Established Before Allowing Any Lethal BDM

WS is aware that some people feel Federal wildlife damage management should not be allowed until economic losses reach some arbitrary predetermined threshold level. Such policy, however, would be difficult or inappropriate to apply to human health and safety situations. Although some damage can be tolerated by most resource owners, resource owners and situations differ widely and a set wildlife damage threshold levels would be difficult to determine or justify. WS has the legal direction to respond to requests for assistance, and it is program policy to aid each requester to minimize losses. WS uses the Decision Model thought process discussed in Chapter 3 to determine appropriate strategies.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that a forest supervisor needs only show that damage from wildlife is threatened, to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993). Thus, there is judicial precedence indicating that it is not necessary to establish a criterion such as percentage of loss of a particular resource to justify the need for wildlife damage management actions.

2.3.5 Effectiveness of Bird Damage Management Methods

A concern among members of the public is whether the methods of reducing bird damage will be effective in reducing or alleviating bird damage and conflicts. The effectiveness of each method or methods can be defined in terms of decreased potential for health risks, decreased human safety hazards, reduced property damage, reduced natural resource damage and reduced agricultural damage. In terms of the effectiveness of a specific method or group of methods, this would not only be based on the specific method used, but more importantly upon the skills and abilities of the person implementing the control methods and the ability of that person to determine the appropriate course of action to take. It would be expected that the more experience a person has in addressing bird damage conflicts and implementing control methods the more likely they would be successful reducing damage to acceptable levels. WS technical assistance program provides information to assist persons in implementing their own BDM program, but at times the person receiving WS technical assistance may not have the skill or ability to implement the BDM methods recommended by WS. Therefore, it is more likely that a specific BDM method or group of methods would be effective in reducing damage to acceptable levels when WS professional bird damage assistance is provided than that would occur when the inexperienced person attempts to conduct BDM activities.

CHAPTER 3: ALTERNATIVES

3.0 INTRODUCTION

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992) as described in Chapter 2 (pages 20-35), Appendix J (Methods of Control), Appendix N (Examples of WS Decision Model), Appendix P (Risk Assessment of Wildlife Damage Control Methods Used by USDA, Wildlife Services Program) of the ADC FEIS (USDA 1997) and Appendix 4 ("*Management Techniques*") of the USFWS Cormorant FEIS (USFWS 2003b).

The No Action alternative is a procedural NEPA requirement (40 CFR 1502), is a viable and reasonable alternative that could be selected, and serves as a baseline for comparison with the other alternatives. The No Action alternative, as defined here, is consistent with the Council on Environmental Quality's (CEQ's) definition (CEQ 1981).

Alternatives analyzed in detail are:

- 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.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1: Technical Assistance Only

This alternative would not allow for WS operational BDM in Vermont. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, corporations, or others could conduct BDM using any legal lethal or non-lethal method available to them. Following USFWS review of a complete justified application (USDA –Wildlife Damage Report –Form 37A, Depredation Permit Application) for a depredation permit from a property owner to take specified bird species, a depredation permit could be issued by the USFWS. The USFWS permit issuance procedure would follow that described in Alternative 2. Currently, DRC-1339 and alpha-chloralose are only available for use by WS employees. Therefore, use of these chemicals by others would not occur legally. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators if it becomes registered for use in the state. Avitrol® could also be used by state certified restricted-use pesticide applicators.

3.1.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) proposes to continue the current damage management program that responds to bird damage in the State of Vermont. An Integrated Wildlife Damage Management (IWDM) approach would be implemented to reduce bird damage to property, agricultural resources (including livestock), natural resources, and human/public health and safety. Damage management would be conducted on public and private property in Vermont when the resource owner (property owner) or manager requests assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using shooting,

trapping, egg addling/destruction, nest destruction, and registered pesticides and other products. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or could include instances where application of lethal methods alone would be the most appropriate strategy. Bird damage management activities would be conducted in the State, when requested and funded, on private or public property, including airport facilities and adjacent or nearby properties, after an *Agreement for Control* or other comparable document has been completed. All management activities would comply with appropriate Federal, State, and Local laws, including applicable laws and regulations authorizing take of birds, and their nest and eggs.

Producers, property owners, agency personnel, corporations, or others could conduct BDM using any legal lethal or non-lethal method available to them. Following USFWS review of a complete justified application (USDA –Wildlife Damage Report –Form 37A, Depredation Permit Application) for a depredation permit from a property owner to take specified bird species, a depredation permit could be issued by USFWS. Upon receipt of a USFWS depredation permit, the permittee (or any listed sub-permittee) may commence the authorized activities and must submit a written report of their activities upon expiration of their permit to the USFWS. Permits may be renewed yearly by the USFWS as needed to resolve the damages, after going through the reauthorization process which includes justification. Not all of the methods listed in Appendix B of the EA as potentially available to WS would be legally available to property owners.

3.1.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

This alternative would require WS to use non-lethal methods only to resolve bird damage problems. Information on lethal BDM methods would still be available to producers and property owners through other sources such as USDA Agricultural Extension Service offices, universities, or pest control organizations. Requests for information regarding lethal management approaches would be referred to VTFW, USFWS, local animal control agencies, or private businesses or organizations. Individuals might choose to implement WS non-lethal recommendations, implement lethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, or take no action. Persons receiving WS's non-lethal technical and direct control assistance could still resort to lethal methods that were available to them. Under this alternative, property owners might be limited to using non-lethal techniques only. Because the USFWS needs professional recommendations on individual damage situations before issuing a depredation permit for lethal takes and the USFWS does not have the mandate or resources to conduct this work, state agencies with responsibilities for migratory birds would have to provide this information to the USFWS, such as VTFW. If the necessary information was provided to the USFWS, following the agency's review of a complete application package for a depredation permit from a property owner to lethally take birds causing damage, the permit issuance procedure would follow that described in Alternative 2.

Currently, DRC-1339 and alpha-chloralose are only available for use by WS employees. Therefore, use of these chemicals by others would be illegal. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators if it becomes registered for use in the state. Avitrol® could also be used by state certified restricted-use pesticide applicators.

3.1.4 Alternative 4: No Federal WS Bird Damage Management

This alternative would eliminate WS involvement in BDM in Vermont. WS would not provide direct operational or technical assistance and requesters of WS's assistance would have to conduct their own BDM without WS input. Information on BDM methods would still be available to producers and property owners through other sources such as USDA Agricultural Extension Service offices, universities, or pest control organizations. Requests for information would be referred to VTFW, USFWS, local animal control

agencies, or private businesses or organizations. Individuals might choose to conduct BDM themselves, use contractual services of private businesses, or take no action. DRC-1339 and alpha-chloralose are only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. However, the restricted use pesticide, Starlicide®, is similar to DRC-1339 and may be used by certified applicators if it becomes registered for use in the state. Avitrol® could also be used by state certified restricted-use pesticide applicators. Under this alternative, property owners might be limited to using non-lethal techniques only. Because the USFWS needs professional recommendations on individual damage situations before issuing a depredation permit for lethal takes and the USFWS does not have the mandate or resources to conduct this work, state agencies with responsibilities for migratory birds would have to provide this information to the USFWS, such as VTFW. If the necessary information was provided to the USFWS, following the agency's review of a complete application package for a depredation permit from a property owner to lethally take birds causing damage, the permit issuance procedure would follow that described in Alternative 2.

3.2 BDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN VERMONT

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2 and 3 described above. Alternative 4 would terminate both WS technical assistance and operational BDM by WS. Appendix B is a more thorough description of the methods that could be used or recommended by WS.

3.2.1 Integrated Wildlife Damage Management (IWDM)

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in the most cost-effective[2] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion), animal behavior modification (e.g., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem. WS considers the biology and behavior of the damaging species and other factors using the WS Decision Model (Slate et al 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requester, WS, or other agency personnel, as appropriate. Two strategies are available:

1. **Preventive Damage Management** is applying wildlife damage management strategies before damage occurs, based on historical problems and data. All non-lethal methodologies, whether applied by WS or resource owners, are employed to prevent damage from occurring and therefore fall under this heading. When requested, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be a cooperator installing and maintaining a fence and/or overhead wire grid system to reduce access of waterfowl to a retention pond or scaring birds away from active runways.

2. **Corrective Damage Management** Corrective damage management is applying wildlife damage management to stop or reduce current losses. As requested and appropriate, WS personnel provide information and conduct demonstrations, or take action to prevent additional losses from recurring. An example would be the removal of waterfowl during the summer molt using round-up techniques or the oiling of eggs during the nesting season. Often, this involves the lethal removal of individual animals.

3.2.2 The IWDM Strategies Employed by WS

[2] T he cost of management may sometimes be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

Technical Assistance Recommendations
"Technical assistance" as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods and approaches. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for use by non-WS entities. Technical assistance may be provided through a personal or telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application. In some instances, wildlife-related information provided to the requestor by WS results in tolerance/acceptance of the situation. In other instances, management options are discussed and recommended.

Under APHIS NEPA implementing regulations and specific guidance for the WS program, WS technical assistance is categorically excluded from the need to prepare an EA or EIS. However, it is discussed in this EA because it is an important component of the IWDM approach to resolving bird damage problems.

Direct Damage Management Assistance (Direct Control)
Direct damage management assistance includes damage management activities that are directly conducted or supervised by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone and when *Agreements for Control* or other comparable instruments are provided for direct damage management by WS. The initial investigation defines the nature, history, and extent of the problem; species responsible for the damage; and methods available to resolve the problem. The professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary or if the problems are complex.

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

Research and Development
The National Wildlife Research Center (NWRC) functions as the research arm of WS by providing scientific information and development of methods for wildlife damage management that are effective and environmentally responsible. NWRC scientists work closely with wildlife managers, researchers, field specialists and others to develop and evaluate wildlife damage management techniques. NWRC research was instrumental in the development of methyl anthranilate. In addition, NWRC is currently testing new experimental drugs that inhibit bird reproduction. NWRC scientists have authored hundreds of scientific publications and reports, and are respected world-wide for their expertise in wildlife damage management.

3.2.2.1 Examples of WS Direct Operational and Technical Assistance in BDM in Vermont

- The Burlington International Airport (BIA) entered into a Cooperative Service Agreement with VT WS to conduct a one year Wildlife Hazard Assessment. WS entered into this agreement for the purpose of assessing, managing, and monitoring bird-related public safety and aviation hazards at BIA. Bird-aircraft strikes and hazards involving rind-billed gulls, other gulls, blackbirds, snow buntings, crows, pigeons, killdeer, kestrels and other birds have created safety hazards at the airport. Since 2000, WS implemented an IWDM approach, consisting of technical assistance and

direct control components: WS suggested development and landscaping plans, habitat management recommendations, threatened and endangered species monitoring, hazardous bird species population management (shooting and trapping), and exclusion.

- A [redacted] requested WS assistance in reducing agricultural losses to European starlings. They were consuming cattle feed, contaminating feed with droppings, and damaging property (accumulations of feces on equipment, buildings and cattle). Implementation of an IWDM program by VT WS, consisting of recommendations of cultural practice and habitat modifications, harassment, population reduction (trapping, shooting, use of DRC-1339) resulted in reduction of the blackbird populations present on the dairy farm, and reduced damage

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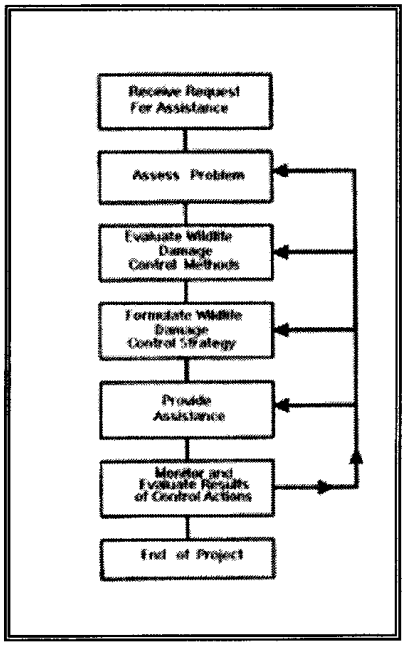
- During the fall of 2003 VT WS in cooperation with the VT Fish and Wildlife Department collected cormorant samples from Lake Champlain. This collection was initiated after the unexplained deaths of numerous cormorants were documented on the lake. Further testing indicated the cause of death to be New Castle's disease. VT WS has also assisted VTFW with cormorant egg oiling activities on state owned islands. Biological impacts resulting from increasing cormorant populations in the Vermont Lake Champlain basin include: 1) adverse effects on other colonial waterbird species through habitat destruction, exclusion and competition for nesting space; 2) destruction of vegetation and loss of habitat particularly where cormorants nest; 3) declines in sportfish populations from predation and the associated impacts to Vermont's tourist industry; 4) aesthetic impacts; 5) water contamination caused by cormorant excrement; and 6) threat of emerging diseases (New Castle's Disease) due to overcrowding and unchecked population growth on VT islands.

- The [redacted] requested help to reduce Canada goose numbers that were creating nuisance and human health problems. WS implementation of an IWDM program, consisting of nest destruction to reduce bird numbers on the lake and offered technical advice on harassment.

3.2.3 WS Decision Making

WS personnel use a thought process for evaluating and responding to damage complaints which is depicted by the WS Decision Model and described by Slate et al. in 1992 (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered non-lethal methods and found them to be impractical, too costly, or inadequate for effectively reducing damage. WS personnel assess the problem then evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, methods deemed to be practical for the situation are incorporated into a management strategy. After this strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for further management is ended. In terms of the WS Decision Model (Slate et al. 1992), most damage management efforts consist of continuous feedback between receiving the request and monitoring the results of the damage management strategy. The Decision Model is not a written documented process, but a mental problem-solving process common to most, if not all, professions.

Figure 3-1
WS Decision Model



3.2.4 Bird Damage Management Methods Available for Use

3.2.4.1 Non-chemical, Non-lethal Methods

Agricultural producer and property owner practices consist primarily of non-lethal preventive methods such as cultural methods[3] and habitat modification.

Animal behavior modification refers to tactics that alter the behavior of birds to reduce damage. Some but not all of these tactics include the following:

- Exclusions, such as netting
- Propane exploders (to scare birds)
- Pyrotechnics (to scare birds)
- Distress calls and sound producing devices (to scare birds)
- Visual repellents and other scaring tactics
- Lasers (to scare birds)
- Dogs (to scare waterfowl)

Nest destruction of the target species before eggs or young are in the nest.

[3] Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife damage.

Egg addling/destruction is the practice of destroying the embryo in the egg prior to hatching; physically breaking eggs; or directly removing eggs from a nest and destroying them.

Habitat/environmental modification to attract or repel certain bird species.

Live traps are various types of traps designed to capture birds alive. Some examples are panel nets, clover traps, decoy traps, nest box traps, mist nets, cannon nets, etc. Captured target birds can then be euthanized.

Lure crops/alternate foods are crops planted or other food resources provided to mitigate the potential loss of higher value crops.

3.2.4.2 Chemical, Non-lethal Methods

Avitrol® is a chemical frightening agent registered for use on pigeons, crows, gulls, blackbirds, starlings, and House sparrows in various situations. This chemical works by causing distress behavior in the birds that consume treated baits from a mixture of treated and untreated bait. These distress calls then generally frighten the other birds from the site. In most cases, those birds that consume the treated bait will die (Johnson and Glahn 1994).

Alpha-chloralose, a central nervous system depressant, is used as an immobilizing agent to capture pigeons, waterfowl (including domestic ducks and geese) or other birds. It is generally used in recreational and residential areas, such as near swimming pools, shoreline residential areas, golf courses, or resorts. Alpha- chloralose is typically delivered as a well-contained bait in small quantities with minimal hazards to pets and humans;bread or corn baits are fed directly to the target birds.

Tactile repellents reportedly deter birds from roosting, perching, or nesting on certain structural surfaces by creating a tacky or sticky surface that the birds avoid.

Methyl Anthranilate (MA) and **Di-methyl Anthranilate** (artificial grape flavoring food additive) has been shown to be an effective repellent for many bird species. It can be applied to turf or surface water or as a fog to repel birds from small areas. It may also become available for use as a livestock feed additive that has bird repellent value.

Other repellents: Other available bird repellents include anthraquinone (Avery et al. 1997) and particulate feed additives, such as charcoal particles (e.g., adhered to livestock feed).

Egg oiling is a method for suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil or mineral oil on eggs in nests.

3.2.4.3 Mechanical, Lethal Methods

Snap traps are considered quick-kill traps. They are modified rat traps that are used to remove individual birds causing damage to buildings.

Shooting is more effective as a dispersal technique than as a way to reduce bird numbers. The number that can be killed by shooting is generally very small in relation to the number involved in damage situations. Usually only a few dozen birds can be shot from individual flocks that can number anywhere from a few hundred to many thousands or hundreds of thousands of birds before the rest of the birds become gun shy. Shooting, however, can be helpful in some situations to supplement and reinforce other dispersal techniques. It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with firearms is

sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible.

Sport hunting can be part of a BDM strategy, and is recommended by WS to enhance the effectiveness of harassment techniques.

Cervical dislocation is approved by the American Veterinary Medical Association (AVMA, Beaver et al. 2001) and may be used to euthanize birds which are captured in live traps.

3.2.4.4 Chemical, Lethal Methods

Avitrol® is a chemical frightening agent (repellent) that is employed as a nonlethal harassment method, and although a small percentage of birds that are present are killed, it is described in Section 3.2.4.2 (Chemical, Non-lethal Methods) and Appendix B.

DRC-1339 is a slow-acting avicide for reducing damage from several species of birds, including cowbirds, grackles, starlings, pigeons, crows, and gulls. DRC-1339 is highly toxic to sensitive species, but only slightly toxic to non-sensitive birds, predatory birds and mammals. This chemical would be the primary lethal chemical method used for bird damage management under the proposed program.

Starlicide® (3-chloro-p-toluidine hydrochloride), a pesticide similar to DRC-1339, is not currently registered for use in Vermont, may be considered for use if it becomes registered in Vermont in the future. As part of the planning process, analysis of potential impacts of this toxicant are being addressed in this EA to determine potential impacts if and when Starlicide® becomes registered for use in VT. Starlicide® is a restricted use pesticide that is formulated as a 0.1% ready-to-use product and is commercially available to certified applicators or persons under their supervision. This avicide may be recommended or used by WS to control European starlings, crows, pigeons, cowbirds, grackles, and certain gull species. Starlicide® may be used in feedlots, around buildings and fenced non-crop areas, bird staging and roosting areas, federal and state wildlife refuges, and other sites (EPA 1995). Starlicide® is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, the properties of this product are similar to DRC-1339.

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.

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered, but not analyzed in detail. These were:

3.3.1 Lethal Bird Damage Management Only By WS

Under this alternative, WS would not conduct any non-lethal control of birds for BDM purposes in the State, but would only conduct lethal BDM. This alternative was eliminated from further analysis because some bird damage problems can be resolved effectively through non-lethal means. Additionally, lethal methods may not always be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms. For example, a number of damage problems involving the encroachment of injurious birds into buildings can be resolved by installing barriers or repairing of structural damage to the buildings, thus excluding the birds. Further, damage situations such as large flocks of injurious birds on/near airport runways could not be alleviated immediately by lethal means,

while scaring them away using various harassment devices might resolve the threat to passenger safety at once.

3.3.2 Compensation for Bird Damage Losses

The compensation alternative would require the establishment of a system to reimburse persons impacted by bird damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the ADC Final EIS indicated that the concept has many drawbacks (USDA 1997):

- It would require larger expenditures of money and labor to investigate and validate all damage claims to determine and administer appropriate compensation.

- Compensation would most likely be less than full market value. Responding in a timely fashion to all requests to assess and confirm damage would be difficult and certain types of damage could not be conclusively verified. For example, proving conclusively in individual situations that birds were responsible for disease outbreaks would be impossible, even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.

- Compensation would give little incentive to resource owners to limit damage through improved cultural, husbandry, or other practices and management strategies.

- Not all resource owners would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.

- Compensation would not be practical for reducing threats to human health and safety.

3.3.3 Use of Bird-proof Feeders in Lieu of Lethal Control at Dairies and Cattle Feeding Facilities

Bird-proof feeders were proposed by Animal Protection of New Mexico (APNM), Inc. as a method for excluding birds at dairies and cattle feeding facilities in that State. This method would involve the installation of 1/8" thick steel panel feed troughs, covered by parallel 4-6 inch spaced steel cables or wires running from the outer top edge of the trough up at a 30-45 degree angle to the top of the head chutes that cattle use to access the feed. Vertical canvas strips would be hung from the cables. The feeder was reportedly designed for use with horses. A copy of a diagram of this system was sent to Mr. Jim Glahn, Bird Control Research Biologist at the WS-National Wildlife Research Center (NWRC), who has nearly 12 years of experience researching problems caused by European starlings at livestock feeding operations. He found the following:

- A major flaw in the design is the spacing of the cables at 4-6" which would allow European starlings to drop through. Reducing the spacing to 2" as recommended by Johnson and Glahn (1994) would likely interfere with the delivery of feed to the troughs. Interference would occur because the feed mixture currently used by most dairies is a mixture of chopped alfalfa hay and corn silage with a grain component. The alfalfa/corn silage portion would likely hang up on the cable or wire strands of the troughs and much would fall outside the troughs, with increased feed waste a result (Twedt and Glahn 1982).

- the spacing of the canvas strips is not specified, and canvas would deteriorate quickly from cattle licking and weather (Twedt and Glahn 1982).

Mr. Glahn expressed the opinion, based on Twedt and Glahn (1982) and Feare (1984), that exclusion methods to reduce starling depredations at livestock feeding operations are usually the least cost-effective solution. Despite the above concerns about the bird-proof feeder system recommended by APNM, Inc., similar types of systems could be recommended by WS under the current program should any become available that are effective, practical, and economically feasible for producers to implement.

3.3.4 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS program efforts toward total long term elimination of bird populations on private, State, Local and Federal government land wherever a cooperative program was initiated in the State. In Vermont, eradication of native bird species is not a desired population management goal of State agencies or WS. Eradication as a general strategy for managing bird damage will not be considered in detail because:

- All State and Federal agencies with interest in, or jurisdiction over, wildlife oppose eradication of any native wildlife species.

- Eradication is not acceptable to most people.

Suppression would direct WS program efforts toward managed reduction of certain problem populations or groups. In areas where damage can be attributed to localized populations of birds, WS can decide to implement local population suppression as a result of using the WS Decision Model.

It is not realistic or practical to consider large-scale population suppression as the basis of the WS program. Typically, WS activities in the State would be conducted on a very small portion of the sites or areas inhabited or frequented by problem species.

3.3.5 Nonlethal Methods Implemented Before Lethal Methods

This alternative is similar to Alternative 2 except that WS personnel would be required to always recommend or use nonlethal methods prior to recommending or using lethal methods to reduce bird damage. Both technical assistance and direct damage management would be provided in the context of a modified IWDM approach. Alternative 2, the Proposed Action, recognizes nonlethal methods as an important dimension of IWDM, gives them first consideration in the formulation of each management strategy, and recommends or uses them when practical before recommending or using lethal methods. However, the important distinction between the Nonlethal Methods First Alternative and the Proposed Alternative is that the former alternative would require that all nonlethal methods be used before any lethal methods are recommended our used.

While the humaneness of the nonlethal management methods under this alternative would be comparable to the Proposed Program Alternative, the extra harassment caused by the required use of methods that may be ineffective could be considered less humane. As local bird populations increase, the number of areas negatively affected by birds would likely increase, and greater numbers of birds would be expected to congregate at sites where nonlethal management efforts were not effective. This may ultimately result in a greater numbers of birds being killed to reduce damage than if lethal management were immediately implemented at problem locations (Manuwal 1989). Once lethal measures were implemented, bird damage would be expected to drop relative to the reduction in localized populations of birds causing damage.

Since in many situations this alternative would result in greater numbers of birds being killed to reduce damage, at a greater cost to the requester, and result in a delay of reducing damage in comparison to the Proposed Alternative, the Nonlethal Methods Implemented Before Lethal Methods Alternative is removed from further discussion in this document.

3.4 MITIGATION AND STANDARD OPERATING PROCEDURES FOR BIRD DAMAGE MANAGEMENT TECHNIQUES

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for effects that otherwise might result from that action. The current WS program, nationwide and in Vermont, uses such mitigation measures and these are discussed in detail in Chapter 5 of the ADC Final EIS (USDA 1997) and Chapter 4 of the DCCO FEIS (USFWS 2003b).

3.4.1 Mitigation in Standard Operating Procedures (SOPs)

Some key mitigating measures pertinent to the proposed action and alternatives of this EA that are also incorporated into WS SOPs include:

- The WS Decision Model thought process which is used to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.
- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS Specialists in Vermont using restricted chemicals are trained and certified by, or operate under the direct supervision of, program personnel or others who are experts in the safe and effective use of chemical BDM materials.
- The presence of non-target species is monitored before using DRC-1339 (or Starlicide®) to reduce the risk of mortality of non-target species populations.
- Research is being conducted to improve BDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate non-target hazards and environmental effects.

3.4.2 Additional Mitigation Specific to the Issues

The following is a summary of additional mitigation measures that are specific to the issues listed in Chapter 2 of this document.

- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across the State, or even across major portions of the State, would not be conducted.
- WS take is monitored by comparing numbers of birds killed by species with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse effects to the viability of native species populations (See Chapter 4).
- WS uses BDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997, Appendix P). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.

- WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-target take.

- Observations of birds in areas that are associated with cormorant concentrations are made to determine if nontarget or T&E species would be at risk from management activities.

- Cormorant management actions taken in mixed-species waterbird colonies would be conducted in such a manner to minimize impacts to non-target species (i.e. visiting sites at times of the day that would avoid thermal stress to eggs/nestlings, conducting actions as early as possible in the nesting season to reduce nestling abandonment, etc.).

- Agents acting under the authority provided to WS to protect public resources (50 CFR 21.48(c)(2)) from cormorant damage will be informed and trained in the safe and proper use of management methods including applicable laws and regulations authorizing use of these methods.

- Observations of birds feeding at feedlots, dairies, or staging areas; or observations of birds that are associated with bird concentrations are made to determine if non-target or T&E species would be at risk from BDM activities.

- WS has consulted with the USFWS regarding potential effects of control methods on T&E species and abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation. For the full context of the Biological Opinion, see the ADC Final EIS, Appendix F (USDA 1997).

- WS will abide by the conservation measures specified in the USFWS FEIS (USFWS 2003) to avoid adverse effects on listed species when conducting cormorant damage management activities.

- Non-toxic shot will be used when using shotguns to harass or kill cormorants.

- WS has consulted with the VTFW Non-game and Natural Heritage Program regarding potential effects of bird damage management control methods on State-listed T&E species.

- WS uses chemical methods for BDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2. This section analyzes the environmental consequences of each alternative in comparison with the no action alternative to determine if the real or potential effects would be greater, lesser, or the same.

The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

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

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

Effects on sites or resources protected under the National Historic Preservation Act: WS BDM actions are not undertakings that could adversely affect historic resources (See Section 1.1.7).

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Effects on Target Bird Species Populations

4.1.1.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would have no impact on target bird populations in the State because the program would not provide any operational BDM activities. The program would be limited to providing advice only. Private efforts to reduce or prevent bird damage and perceived disease transmission risks could increase, which could result in similar or even greater effects on those populations than the Proposed Action. However, for the same reasons shown below in the population effects analysis in section 4.1.1.2, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC-1339 and the tranquilizer alpha-chloralose are currently only available for use by WS employees and would not be available for use under this alternative.

4.1.1.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Analysis of this issue is limited to those species killed during WS BDM. The analysis for magnitude of impact generally follows the process described in Chapter 4 of USDA (1997). Magnitude is described in USDA (1997) as "*. . . a measure of the number of animals killed in relation to their abundance.*" Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available. Generally, WS only conducts damage management on species whose population

densities are high and usually only after they have caused damage. Tables 4-1 and 4-2 identify the number of birds and eggs taken and the number of birds harassed by WS during FY2000-FY2002.

Table 4-1. Birds lethally removed and eggs removed by WS for Bird Damage Management during FY 2000 through FY 2002 in Vermont.

Species	Trapping	Shooting	DRC 1339	Mist Net	Nests (eggs) Removed/ Treated
Double Crested Cormorant	0	2	0	0	3453*
Brown-headed Cowbird	0	0	1	0	0
American Crow	0	2	0	0	0
Canada Goose	0	2	0	0	139
Great Black-backed Gull	0	3	0	0	0
Herring Gull	0	8	0	0	0
Ring-billed Gull	0	35	0	0	0
Pigeon	0	63	0	2	0
House Sparrow	0	1	0	184	0
European Starling	0	0	220	4	0
Total	0	116	221	188	3592

* Represents 1,741 and 51 nests respectively, from state owned Young and Woods Islands and 45 nests from a privately owned Island on Lake Champlain in 2000, 776 nests from Young Island in 2001, and 840 nests from Young Island in 2002.

Table 4-2. Number of birds harassed by WS for Bird Damage Management activities from FY 2000 through FY 2002 in Vermont.

Species	FY 2000*	FY 2001*	FY 2002	FY 2000-02
Double Crested Cormorant	NA[1]	NA[1]	NA[1]	Unknown
Red-winged Blackbird	NA	NA	721	721
Snow Bunting	NA	NA	7	7
Canada Goose	NA	NA	12	12
Snow Goose	NA	NA	1	1
Common Grackle	NA	NA	32	32
Great Black-backed Gull	NA	NA	3,106	3,106
Herring Gull	NA	NA	228	228
Ring-billed Gull	NA	NA	14,002	14,002
Killdeer	NA	NA	3	3
Mallard	NA	NA	60	60
House Sparrow	NA	NA	64	64
European Starling	NA	NA	4,509	4,509
Turkey Vulture	NA	NA	279	279
Total	NA	NA	23,024	23,024

* Counts of birds harassed were not kept before FY 2002. [1] While no counts were maintained, WS provided pyrotechnics and/or propane canons to 2 private landowners on Lake Champlain and 1 private landowner on Lake Memphremagog for the purpose of harassing an unknown number of Cormorants from 2000 to 2002.

Breeding Bird Surveys. Bird populations can be monitored by using data from the Breeding Bird Surveys (BBS). The BBS is a large-scale inventory of North American birds coordinated by the U.S. Geological Survey, Patuxent Wildlife Research Center (Sauer et al 2003). The BBS is a

combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The BBS was started in 1966, and routes are surveyed in June by experienced birders. The stated primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally, as a result of variable annual local habitat and climatic conditions. Trends can be determined using different population equations, and statistically tested to determine if a trend is significant. The significance of a trend's "change" is reflected in the calculated P-value (probability) for that species.

The BBS data is best used to monitor population trends. However, the average number of birds per route (relative abundance) can be used to theoretically estimate the population size (relative abundance/10 mi^2 x 9,615 (total land/water area in Vermont)). To use these population estimates the following assumptions would need to be accepted.

1. All birds within a quarter mile of the observer are seen at all stops on a BBS route; this assumption is faulty because observers often cannot see a quarter mile in radius at all stops due to obstructions such as hills, trees, and brush and because some bird species can be very elusive. Therefore, the number of birds seen per route would provide a conservative estimate of the population.
2. The chosen survey routes are totally random and are fully representative of available habitats. When BBS routes are established, survey rules allow the observers to make stops for surveys based on better quality habitat or convenient parking areas, even though the survey sites are supposed to be spaced a half-mile apart. Therefore, if survey areas had stops with excellent food availability, the count survey could be biased. This would tend to overestimate the population. However, if these sites were not on a route at all, the population could be underestimated.
3. Birds are equally distributed throughout the survey area and routes were randomly selected. Routes are randomly picked throughout the State, but are placed on the nearest available road. Therefore, the starting point is picked for accessibility by vehicle. However a variety of habitat types are typically covered since most BBS routes are selected because they are "off the beaten path" to allow observers to hear birds without interruption from vehicular noise.

Christmas Bird Counts. The National Audubon Society (NAS) conducts nationwide bird surveys in December to early January (the NAS Christmas Counts). The Christmas Bird Counts (CBC) reflect the number of birds frequenting the state during the winter months. The CBC data does not provide a population estimate, but can be used as an indicator of trends in the population. Researchers have found that population trends reflected in CBC data tend to correlate well with those from censuses taken by more stringent means (National Audubon Society 2002).

European Starlings

Colonization of North America by the European Starling began on March 6, 1890 when a Mr. Eugene Scheifflin, a member of the Acclimatization Society, released 80 starlings into New York's Central Park. By 1918, the advance line of migrant juveniles extended from Ohio to Alabama; by 1926 from Illinois to Texas; by 1941 from Idaho to New Mexico; and by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the starling had colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984). However, because starlings are an introduced rather than a native species, they are not protected by federal law, nor are they protected by Vermont state law.

Precise counts of starling populations do not exist but one estimate placed the nationwide starling population at an estimated 140 million birds (Johnson and Glahn 1994). More recent estimates

place the nationwide population at 200 million (Walsh et al. 1999). Natural mortality in starling populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1997). Therefore the estimated natural mortality of starlings in the U.S should be between 70 and 91million birds annually. Based upon an anticipated increase in requests for services, WS's lethal management of starlings in Vermont would be expected to be no more than approximately 1.5% of the total natural mortality in any one year under the Proposed Action.

Breeding Bird Survey trend data from 1966-2002 indicate that European starling populations have decreased at an annual rate of -0.3%, -0.6%, and -0.9% throughout Vermont, the United States, and the eastern region, respectively (Sauer et al. 2003). With a relative abundance of 51.99, a total Vermont summer starling population could be estimated at approximately 50,000 birds. Vermont Christmas Bird Count data from 1966-2002 shows an increasing population trend for wintering populations of starlings throughout the state (National Audubon Society 2002).

Starlings are non-indigenous and often have negative impacts on and compete with native birds. They typically have two broods between early April and mid-June (Leck 1984). Starlings gather in large flocks after the breeding season, and large roosts in Vermont urban/suburban areas pose problems for homeowners and others. Starlings are considered by many wildlife biologists and ornithologists to be an undesirable component of North American ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could be considered a beneficial impact to native bird species.

Based on the above information and WS limited lethal take of starlings in Vermont, WS should have minimal effects on local, statewide, regional or continental starling populations.

Rock pigeons

Rock pigeons, (also commonly referred to as feral domestic pigeons, or rock doves), are a non-indigenous species that were first introduced into the United States by European settlers as a domestic bird to be used for sport, carrying messages, and as a source of food (USFWS 1981). Many of these birds escaped and eventually formed the feral pigeon populations that are now found throughout the United States, southern Canada, and Mexico (Williams and Corrigan 1994). However, because pigeons are an introduced rather than a native species, they are not protected by federal law or Vermont state law.

Pigeons are highly dependent on humans to provide them with food and sites for roosting, loafing, and nesting (Williams and Corrigan 1994), and their nesting is usually associated with man-made structures, particularly bridges and building ledges (Walsh et al. 1999). Thus, they are commonly found around city buildings, bridges, parks, farm yards, grain elevators, feed mills, and other manmade structures (Williams and Corrigan 1994). Additionally, although pigeons are primarily grain and seed eaters, they will readily feed on garbage, livestock manure, spilled grains, insects, and any other available bits of food (Williams and Corrigan 1994).

Breeding Bird Survey trend data from 1966-2002 indicate that pigeon populations are stable (0.0%) throughout the United States and have increased at an annual rate of 3.9% and 0.1% throughout Vermont and the eastern region, respectively (Sauer et al. 2003). With a relative abundance of 7.31, a total Vermont summer pigeon population could be estimated at approximately 7,000 birds. Vermont Christmas Bird Count data from 1966-2002 shows an increasing population trend for wintering populations of pigeons throughout the state (National Audubon Society 2002).

Any BDM involving lethal control actions by WS for this species would be restricted to isolated, individual sites, or communities. In those cases where rock pigeons (also commonly referred to as

feral domestic pigeons, or rock doves) are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since the affected property owner or administrator would request it. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. However, some individuals who experience aesthetic enjoyment of pigeons may consider major population reduction in some localities a negative impact.

Based upon an anticipated increase in requests for services, WS's lethal management of pigeons in Vermont would be expected to be no more than approximately 1,700 pigeons in any one year under the Proposed Action. In addition WS may remove up to 1,000 pigeon nests on an annual basis.

Based on the above information and WS limited lethal take of pigeons in Vermont, WS should have minimal effects on local, statewide, regional or continental pigeon populations.

House Sparrows

House sparrows, sometimes referred to as House sparrows, were introduced to North America from England in 1850 and have spread throughout the continent (Fitzwater 1994). Like European starlings and pigeons, because of their negative effects on and competition with native bird species, House sparrows are considered by many wildlife biologists, ornithologists, and naturalists to be an undesirable component of North American ecosystems. House sparrows are found in nearly every habitat except dense forest, alpine, and desert environments. They prefer human-altered habitats, and are abundant on farms and in cities and suburbs (Robbins et al. 1973). However, because House sparrows are an introduced rather than a native species, they are not protected by federal law, nor are they protected by Vermont state law.

Breeding Bird Survey trend data from 1966-2002 indicate that House sparrow populations have increased at an annual rate of 0.6% throughout Vermont and have decreased at an annual rate of -2.5% and -2.7% throughout the United States and the eastern region, respectively (Sauer et al. 2003). With a relative abundance of 15.98, a total Vermont summer sparrow population could be estimated at approximately 15,300 birds. Vermont Christmas Bird Count data from 1966-2002 shows a relatively stable population trend for wintering populations of sparrows throughout the state (National Audubon Society 2002).

The change in farming practices may have been a factor for their recent population decline. The considerable decline in small farms and associated disappearance of a multitude of small feed lots, stables and barns, may have reduced House sparrow populations, as these sites were a primary source of food in the early part of the 20th century. Ehrlich et al. (1988) suggested that House sparrow population declines might be linked to the dramatic decrease during the 20th century in the presence of horses as transport animals. Grain rich horse droppings were apparently a major food source for this species.

Any BDM involving lethal control actions by WS for this species would be restricted to isolated, individual sites, or communities. In those cases where sparrows are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since the affected property owner or administrator would request it. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems. However, some individuals who experience aesthetic enjoyment of sparrows may consider major population reduction in some localities a negative impact.

Based upon an anticipated increase in requests for services, WS's lethal management of House sparrows in Vermont would be expected to be no more than approximately 1,000 sparrows in any one year under the Proposed Action. In addition WS may remove up to 1,000 sparrow nests on an annual basis.

Based on the above information and WS limited lethal take of House sparrows in Vermont, WS should have minimal effects on local, statewide, regional or continental sparrow populations.

Ring-billed Gulls

Ring-billed gulls are present throughout the year in Vermont, but are most abundant during April-October, where they are typically found near Lake Champlain and other inland lakes and reservoirs surrounded by agricultural land (Laughlin and Kibbe 1985). They are migratory birds which prefer to nest on islands with sparse vegetation. The U.S. breeding population of ring-billed gulls is divided into two populations; the western population and the eastern population. The eastern breeding population of the United States includes New York, Vermont, Ohio, Illinois, Michigan, Wisconsin, and Minnesota (Blokpoel and Tessier 1986). Ring-billed gulls nest in high densities. Nesting colonies may be located on islands, parklands, slag yards, rooftops, breakwalls, and landfills (Blokpoel and Tessier 1986).

Ring-billed gulls are by far the most abundant nesting gull in Vermont, outnumbering herring gulls by 60 to 1 (Laughlin and Kibbe 1985). This was not always the case. Early references, including Thompson (1853) and Wolfe (1923), indicated that the herring gull was the sole nesting gull on Lake Champlain. In fact, no confirmed record of the ring-billed existed for Vermont until November 1939 (Weaver 1939). The first Vermont nesting of ring-billed gulls occurred on Young Island – the current site of Vermont's largest colony – in 1951, when about 100 pairs were located (Miller and King 1981). From 1999 to 2000, the average number of nesting pairs observed on Lake Champlain's Young and Four Brothers Islands was 22,028 pairs per year (Capen, Unpublished Data, UVM/VT Audobon). According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. Therefore the total ring-billed gull population (breeders and non-breeders) on these two islands is estimated at approximately 66,000 gulls.

Breeding Bird Survey trend data from 1966-2002 indicate that ring-billed gull populations have decreased at an annual rate of -2.5% throughout Vermont and have increased at an annual rate of 3.4% and 2.9% throughout the United States and the eastern region, respectively (Sauer et al. 2003). Vermont Christmas Bird Count data from 1966-2002 shows a relatively stable trend for wintering populations of ring-billed gulls throughout the state (National Audubon Society 2002).

Ring-billed gulls are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on ring-billed gull populations would have no significant adverse impact on the quality of the human environment. During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued six (6) depredation permit to Vermont entities to take 238 ring-billed gulls and 1,767 nests to protect property, natural resources, agriculture, and human health and safety.

Based upon an anticipated increase in requests for services, WS's lethal management of ring-billed gulls in Vermont would be expected to be no more than approximately 700 birds in any one year

under the Proposed Action. In addition WS may remove up to 2,000 ring-billed gull nests on an annual basis.

Based on the above information, USFWS oversight, and WS limited lethal take of gulls in Vermont, WS should have minimal effects on local, statewide, regional or continental ring-billed gull populations.

Herring Gulls

Herring gulls are the most widely distributed gull species in the Northern Hemisphere. In Vermont, however, ring-billed gulls outnumber herring gulls by at least 60 to 1 (Laughlin and Kibbe 1985). Herring gulls breed in colonies near oceans, lakes, or rivers (Bent 1921). They will nest in natural or man-made sites, such as rooftops and breakwalls (Blokpoel and Scharf 1991b), but choose in Vermont to nest on various islands in Lake Champlain, some devoid of any trees. In these instances, herring gull ground nests are bulky structures of grass, weeds, and other debris (Laughlin and Kibbe 1985). The first reported nesting of this species in Lake Champlain dates back to at least the 1850s. Thompson (1853) called herring gulls "not uncommon on Lake Champlain where numbers of them breed on the small, uninhabited islands." Today, the majority of Vermont nesting colonies continue to be on Lake Champlain islands: [redacted] Young [redacted] (Laughlin and Kibbe 1985). Since Lake Champlain freezes in most years, there is a mid-winter exodus of almost all gulls from the lake (Laughlin and Kibbe 1985).

From 2001 to 2003, the average number of nesting pairs observed on Lake Champlain was 185 pairs per year (Capen, Unpublished Data, UVM). According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. Therefore the total herring gull population (breeders and non-breeders) on Lake Champlain is estimated at approximately 555 gulls.

Breeding Bird Survey trend data from 1966-2002 indicate that herring gull populations have decreased at annual rate of -16.1%, -1.6% and -3.5% throughout Vermont, the United States, and the eastern region, respectively (Sauer et al. 2003). Gull populations increase dramatically during fall-spring migration period, peaking in the winter. Therefore, the over wintering population of herring gulls is considerably higher than the breeding population in Vermont. Christmas Bird Count data from 1966-2002 shows a relatively stable trend for wintering populations of herring gulls throughout the state (National Audubon Society 2002).

Herring gulls are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on herring gull populations would have no significant adverse impact on the quality of the human environment. During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued four (4) depredation permits to Vermont entities to take 118 herring gulls and 107 nests to protect property, natural resources, agriculture, and human health and safety.

Based upon an anticipated increase in requests for services, WS's lethal management of herring gulls in Vermont would be expected to be no more than approximately 100 birds in any one year under the Proposed Action. In addition WS may remove up to 100 herring gull nests on an annual basis.

Based on the above information, USFWS oversight, and WS limited lethal take of gulls in Vermont, WS should have minimal effects on local, statewide, regional or continental herring gull populations.

Great Black-backed Gulls

The great black-backed gull is a marine species, which breeds in the North Atlantic region. They are mainly coastal, but often appear inland associated with landfills and other waste handling facilities. During the winter these gulls can also be found along the Great Lakes and larger rivers, such as the St. Lawrence River (Angehrn et al. 1979, Bull 1974). The over-wintering population of great black-backed gull has been increasing along the Great Lakes, along with the expansion of their breeding range (Angehrn et al. 1979). According to Blokpoel and Scharf (1991b), there has probably never been more than a dozen nesting pairs of great black-backed gulls along the Great Lakes.

The first record of a great black-backed gull in Vermont was of an adult near Brattleboro on December 31, 1948 (Smith 1950a; CBC 1948-49). Numbers increased steadily during the next two decades, especially on Lake Champlain. On May 21, 1983, the first record of breeding great black-backed gulls was recorded when a pair, one of which was incubating eggs, was discovered on Young Island in Lake Champlain (Laughlin and Kibbe 1985). Breeding still occurs today on Lake Champlain islands. From 2001 to 2003, the average number of nesting pairs observed on Lake Champlain was 8 pairs per year (Capen, Unpublished Data, UVM/VT Audubon). According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. Therefore the total black-backed gull population (breeders and non-breeders) on Lake Champlain is estimated at approximately 24 gulls.

Breeding Bird Survey trend data from 1966-2002 indicate that black-backed gull populations have decreased at an annual rate of -4.8% and -2.2% throughout the United States and the eastern region, respectively (Sauer et al. 2003). No Breeding Bird Survey trend data was available for great black-backed gull populations in Vermont (Sauer et al. 2003). Gull populations increase dramatically during fall-spring migration period, peaking in the winter. Therefore, the over wintering population of black-backed gulls is considerably higher than the breeding population in Vermont. Vermont Christmas Bird Count data from 1966-2002 shows an increasing trend for wintering populations of black-backed gulls throughout the state (National Audubon Society 2002).

Great black-backed gulls are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on great black-backed gull populations would have no significant adverse impact on the quality of the human environment. During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued four (4) depredation permits to Vermont entities to take 104 great black-backed gulls and 86 nests to protect property, natural resources, agriculture, and human health and safety.

Based upon an anticipated increase in requests for services, WS's lethal management of black-backed gulls in Vermont would be expected to be no more than approximately 30 birds in any one year under the Proposed Action. In addition WS may remove up to 50 black-backed gull nests on an annual basis.

Based on the above information, USFWS oversight, and WS limited lethal take of gulls in Vermont, WS should have minimal effects on local, statewide, regional or continental black-backed gull populations.

Double-crested Cormorant Population Effects

As stated in the USFWS FEIS (USFWS 2003b), the recent increase in the North American DCCO population, and subsequent range expansion, has been well-documented along with concerns of negative impacts associated with this expanding population. Wires et al. (2001) and Jackson and Jackson (1995) have suggested that the current DCCO 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 MBTA. Nonetheless, there appears to be a correlation between increasing DCCO populations and growing concern about associated negative impacts, thus creating a very real management need to address those concerns.

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 U.S. 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 2003b). Tyson et al. (1999) found that the cormorant population increased about 2.6% annually during the early 1990's. 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 the U.S. 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 this region declined 6.5% overall during the early to mid 1990s, populations have continued to grow rapidly throughout New England (USFWS 2003b). The number of breeding pairs of cormorants in the Atlantic and Interior population is estimated at over 85,510 and 256,212 nesting pairs, respectively (Tyson et al. 1999).

Data from the BBS (1966-2002) shows that double-crested cormorant populations throughout the United States and the Eastern region have increased at an annual rate of 8.0% and 8.7, respectively (Sauer et al. 2003). Sauer et al. (2003) provides no information for the population of cormorants in Vermont. No Christmas Bird Count data was available for double-crested cormorants in Vermont (National Audubon Society 2002). From 1995 to 2002, the average number of nesting DCCO pairs observed on Lake Champlains Young and [redacted] Island was 3,370 pairs per year (Capen, Unpublished data, UVM). This population estimate does not include sub-adults and non-breeding birds. Estimates of 0.6 to 4.0 non-breeding cormorants per breeding pair have been used for several populations (Tyson et al. 1999). Therefore, the cormorant population for these two islands is conservatively estimated at more than 8,762 birds.

Blackwell et al. (2000a) examined the relationship between numbers of piscivorous birds reported killed under USFWS permits at aquaculture facilities in New York, New Jersey, and Pennsylvania and species population trends within the respective states. The USFWS issued 26 permits to 9 facilities from 1985 through 1997. Eight species appeared on permits, but only six species were reported killed: black-crowned night-herons (*Nycticorax nycticorax)*, double crested cormorant (*Phalacrocorax auritus)*, great blue herons (*Ardea herodias)*, herring gulls (*Larus argentatus)*, ring-billed gulls (*L. delawarensis)*, and mallards (*Anas platyrhynchos)*. The number of birds reported killed, relative to systematic long-term population trends, is considered to have had negligible effects on the population status of the respective species. Catfish farmers in the delta region of Mississippi reported taking more cormorants under the Cormorant Depredation Order than previously reported under past depredation permits issued to individual farmers. The

reported take of 9,557 birds by Mississippi catfish farmers had no apparent impacts on wintering populations during 1998-99 (Glahn 2000).

Double-crested cormorants are protected by the USFWS under the MBTA. 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 USFWS Public Resource Depredation Order (PRDO) (50 CFR 21.48), and the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on double-crested cormorant populations would have no significant adverse impact on the quality of the human environment.

Nationwide, the USFWS predicts that the implementation of the USFWS Aquaculture Depredation Order (50 CFR 21.47), PRDO and issuance of migratory bird permits will affect approximately 8% of the continental DCCO population on an annual basis (USFWS 2003b). Furthermore, the USFWS predicts 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 2003b). This includes DCCOs that may be killed in Vermont under the PRDO by WS, VTFW, and Indian Tribes; and those taken under USFWS issued permits. DCCOs are a long-lived bird and egg addling programs are anticipated to have minimal effects on regional or continental cormorant populations (USFWS 2003b).

Public Resource Depredation Order (50 CFR 21.48)

According to the USFWS (2003b), under the PRDO, the implementation of a state-wide program to reduce cormorant impacts to public resources on land and freshwaters could result in the lethal take of up to an additional 4,140 cormorants on an annual basis in Vermont. The USFWS predicts that the implementation of the PRDO in Vermont will have no significant impact to regional or continental DCCO populations (USFWS 2003b).

USFWS Migratory Bird Permits

During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued three (3) depredation permits to Vermont entities to take 125 double-crested cormorants and 3,400 nests to protect property, natural resources, and human health and safety. In 2001 and 2002, the USFWS authorized WS to take 125 double-crested cormorants each year under USFWS issued migratory bird permits in VT. WS took zero of the 125 birds authorized to be taken in each of these 2 years (Management Information System [MIS] Database Query). The USFWS predicts that the issuance of migratory bird permits in Vermont will have no significant impact to regional or continental DCCO populations (USFWS 2003b).

Based on past requests for WS assistance and a predicted increase in future requests for services, WS does not anticipates lethally removing more than 800 cormorants on an annual basis in Vermont. In addition WS may remove up to 1,000 cormorant nests on an annual basis.

Based upon the above information, Vermont WS potential impacts to populations of double-created cormorants has been and is expected to continue to be insignificant to the overall viability and reproductive success of this bird species population on a local, regional, and nationwide scale.

Snow Geese

The snow goose is a common and numerous migrant along Lake Champlain in Vermont (B. Crenshaw, VTFW, Pers. Comm., 2004). Snow geese breed in Arctic Canada from Ellesmere Island south to northern Ontario, and on the east coast of the U.S., winters from New York to North Carolina (Walsh et al. 1999).

No Breeding Bird Survey trend data was available for snow goose populations (Sauer et. al 2003). No Christmas Bird Count data was available for snow geese in Vermont (National Audubon Society 2002). According to USFWS (2003a), the greater snow goose population spends at least a portion of the winter in Vermont. Waterfowl survey data from 1972-2003 show an increasing trend for this population of snow geese. Greater snow goose breeding population estimates have increased an average of 2% a year since 1994, with midwinter counts increasing at an average of 5% per year from 1994-2003 (USFWS 2003a). Snow geese do not winter in Vermont. During spring migration, however, approximately 600,000 snow geese visit the Lake Champlain valley, while about 40,000 birds stopover during fall migration (B. Crenshaw, VTFW, Pers. Comm., 2004).

In Vermont, the 81-day snow goose season occurs during October-December throughout the state. During the 2001-02 hunting season in Vermont, an estimated 3,700 snow geese were harvested (B. Crenshaw, VTFW, Pers. Comm., 2004).

Snow geese are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Therefore, snow geese are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on snow goose populations would have no significant adverse impact on the quality of the human environment. During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued two (2) depredation permit to Vermont entities to take 50 snow geese to protect agriculture and human health and safety.

Based upon an anticipated increase in requests for services, WS's lethal management of snow geese in Vermont would be expected to be no more than approximately 300 geese in any one year under the Proposed Action.

Based on the above information, USFWS oversight, and WS limited lethal take of snow geese in Vermont, WS should have minimal effects on local, statewide, regional or continental snow goose populations.

Canada Geese

Canada geese are one of North America's greatest wildlife success stories, and most biologists believe that there are more Canada geese now than at any time in history (Rusch et al. 1995, Ankney 1996). The total number of Canada geese counted during the winter in North America has increased from 980,000 in 1960 to 3,734,500 in 2000 (Mid-winter Survey unpublished reports). There are two behaviorally distinct types of Canada goose populations: Resident and Migratory. Based on personal communication with Bill Crenshaw, State Waterfowl Biologist for VTFW (2004), the resident Canada goose population in Vermont is currently estimated between 5,000 and 10,000 birds. During the winter, Canada geese numbers in Vermont range from 0 to 1,000 birds (B. Crenshaw, VTFW, Pers. Comm., 2004).

Resident Canada Geese

A resident Canada goose is one that nests and/or resides on a year round basis within the conterminous United States (Rusch et al. 1995, Ankney 1996). More specifically, the Atlantic Flyway Council defines a "resident" Canada goose in the Atlantic Flyway as geese that are hatched or nest in any Atlantic Flyway state, or in Canada at or below 48^0 N latitude and east of 80^0 W longitude, excluding Newfoundland. This population inhabits the States along the U.S. Atlantic Coast, southern Quebec, and the southern Maritime Provinces of Canada (USFWS 2001). As their name implies, resident Canada geese spend most of the year near their breeding areas, although many in northern latitudes do make seasonal movements (Atlantic Flyway Council 1999). The Atlantic Flyway's resident Canada goose population is comprised of various subspecies or races of Canada geese, including *B.c.maxima, B.c.moffetti, B.c. interior, B.c.canadensis*, and possibly other subspecies, reflecting their diverse origins (Dill and Lee 1970, Pottie and Heusmann 1979, Benson et al. 1982, in AFC 1999). Giant (*B.c.maxima*) and western Canada geese (*B.c.moffetti*) are the largest 2 of the 11 subspecies, ranging in weight from 8 to 15 pounds. Resident Canada geese were introduced into the Atlantic Flyway during the early 1900's and now comprise the largest population of geese in the Flyway, with an estimated 1.1 million birds in Spring 1999 (Atlantic Flyway Council 1999). In 2003, the spring resident goose population for the Atlantic Flyway was estimated at over 1million geese in the northeastern United States (USFWS 2003a). Annual estimates of the Atlantic Flyway resident Canada goose population have increased an average of 4% per year since 1994 (USFWS 2003a). Breeding Bird Survey trend data from 1966-2002 indicate that Canada goose populations have increased at annual rate of 30.9%, 10.4% and 20.5% throughout Vermont, the United States, and the eastern region, respectively (Sauer et al. 2003).

Resident Canada geese become sexually mature and breed at two or three years of age and have a relatively high nesting success compared to migrant Canada geese (USFWS 2001). A statewide study of resident goose population ecology in New Jersey indicated that resident goose nest success is high and generation time is shorter for resident geese than for migrant geese (Atlantic Flyway Council 1999). On average, 67% of all goose nests hatched at least one gosling, and gosling survival was good. Survival rates based on leg band recoveries averaged 83% for all age classes (Castelli and Trost 1996). Population modeling indicated that the New Jersey resident population could be expected to double in 11 years. Breeding resident Canada geese occur in every county of Vermont, and nest primarily during April-June each year. In Vermont, resident Canada geese nest in traditional sites along shorelines, on islands and peninsulas.

Molting is the process whereby geese annually replace their primary and secondary flight (wing) feathers (Welty 1982). In Vermont, resident Canada geese molt, and are flightless, from mid-June through mid-July each year. Portions of a flock of geese can be flightless from about one week before and two weeks after molt due to the asynchronous molting by individual birds. Non-breeding resident Canada geese and geese which have failed nesting attempts sometimes move to other areas in the summer prior to molting (Zicus 1981, Nelson and Oetting 1991, Abraham et al. 1999).

The resident Canada goose management goal of the Atlantic Flyway Council is to achieve an optimal balance between the positive values and conflicts associated with these birds (Atlantic Flyway Council 1999). Five Management Objectives are identified in the Atlantic Flyway Resident Canada Goose Management Plan (Atlantic Flyway Council 1999):

1. Reduce resident Canada goose populations in the Atlantic Flyway (AF) to 650,000 birds (spring estimate) by 2005, distributed in accordance with levels prescribed by individual states and provinces. The Vermont population goal is 5,000 geese.
2. Permit a wide variety of effective and efficient options for relief of damage and conflicts associated with resident Canada geese.

3. Provide maximum opportunities for use and appreciation of resident Canada geese, consistent with population goals.
4. Ensure compatibility of resident goose management with management of migrant goose populations in the AF, and vice versa.
5. Annually monitor populations, harvest, and damage/conflict levels to evaluate effectiveness of management options.

Migratory Canada Geese

Migratory Canada geese are those which nest and raise their young in the arctic and sub-arctic regions of Canada. Migrant geese begin moving north in time to arrive on their breeding grounds concurrent with the disappearance of ice cover and the availability of nest sites. Migrant geese arrive on the breeding grounds from mid-April on James Bay, late April for Hudson Bay, mid-May for the Yukon-Kuskokwin Delta of Alaska, to June for the islands in the Arctic (Bellrose 1980). Most subspecies of migratory geese do not nest until the ages of 3-5 years (Hardy and Tacha 1989, Moser and Rusch 1989, Rusch et al.1996). Migrating Canada geese move northward fairly gradually following the retreating snow cover (Bellrose 1980). For the last portion of migration, northern-nesting geese often overfly areas of snow in boreal forests to arrive on Arctic and Subarctic nesting areas just as spring breaks. The most southerly wintering geese leave their wintering areas in January and geese wintering at middle-latitudes move northward in March or April (Bellrose 1980).

Migrant Canada geese move much farther to wintering areas than do resident geese and are typically found in Vermont interspersed among resident goose populations during the fall, but uncommon during winter months. In the Atlantic flyway, migratory Canada geese consist primarily of the Atlantic Population (AP), North Atlantic Population (NAP), and the Southern James Bay Population (SJBP) (USFWS 2003a). The winter migratory population in Vermont is primarily comprised of the Atlantic population. Vermont Christmas Bird Count data from 1966-2002 shows a relatively stable trend for wintering populations of Canada geese throughout the state (National Audubon Society 2002).

The USFWS provides the following status report for the three migratory populations of Canada geese in the Atlantic flyway (USFWS 2003a):

Atlantic Population

This population of migratory Canada geese nest throughout Quebec, especially along the Ungava Bay, the eastern shore of Hudson Bay, and the Ungava Peninsula and winters from New England to South Carolina. In 2003, the number of breeding pairs for the Atlantic Population was estimated to be 156,900, 5% lower than the 2002 estimate. This population continues to increase from a low of 29,000 breeding pairs in 1995. The breeding pairs estimates have increased 19% per year since 1994. The estimated total 2002 spring population of Atlantic Population geese was 760,300 birds. This was a 22% decrease below the 2002 estimate. The 10 year breeding population trend appears to be increasing.

North Atlantic Population

This population of migratory Canada geese nests in Newfoundland and Labrador, and although they do mix with AP and Resident geese during the winter, they maintain more coastal distributions. In 2003, there were an estimated 60,800 pairs of geese in the NAP, essentially unchanged from 2002. Indicated pair estimates have declined an average of 5% per year since 1996. There are an estimated 133,300 NAP geese in the Atlantic Flyway in 2002, a 31% decrease over 2002 estimates. The 8 year breeding population trend appears to be relatively stable.

Southern James Bay Population

This population nests on Akimiski Island in James Bay and in the adjacent Hudson Bay lowlands to the south and west. The Southern James Bay Population winters from southern Ontario and Michigan to Mississippi, Alabama, Georgia, and South Carolina. In 2002, breeding ground surveys indicated a spring population of 106,500 geese, 40% higher than 2002. The 10 year breeding population trend appears to be relatively stable.

Canada goose hunting occurs statewide. A special September goose hunting season occurs from September 2-25 with a bag limit of 3 geese per day. Hunting in September is targeted towards resident geese as very few or no migrant geese have arrived at this time. The regular goose season (for migratory geese) is set for October 25-December 8 with a bag limit of 2 birds per day (B. Crenshaw, VTFW, Pers. Comm., 2004). Table 4-3 provides available hunter harvest data for these 2 hunting seasons since 1997.

While the Special Winter and Special September seasons have contributed in targeting harvest of resident geese, additional strategies are needed to effectively manage the resident goose population (Mississippi Flyway Council Technical Section 1996). Resident geese also avoid hunting mortality through their extensive use of urban and suburban environments. Resident Canada goose harvest rates are not uniform throughout a large area such as a state. Urban-suburban areas often provide exceptional goose habitat and allow geese to remain in "refuges" and avoid peak harvest periods (i.e., weekends).

T able 4-3. Number of Canada geese harvested in Vermont during Regular and Special September Seasons during 1997-2002 (B. Crenshaw, VTFW, Pers. Comm., 2004).

Year	Number of Geese Harvested Regular Season	Number of Geese Harvested Special September Season	Total
1997	No season	No season	No seasons
1998	No season	2,700	2,700
1999	800	1,700	2,500
2000	300	1,000	1,300
2001	1,000	2,700	3,700
2002	3,000	4,100	7,100

Canada geese are protected by the USFWS under the Migratory Bird Treaty Act. Therefore, Canada geese are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on Canada goose populations would have no significant adverse impact on the quality of the human environment. During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued ten (10) depredation permit to Vermont entities to take 191 Canada geese and 360 nests to protect property, natural resources, agriculture, and human health and safety.

Based upon past requests for WS assistance and an anticipated increase in future requests for services, WS anticipates that no more than 5% of the resident goose population (spring/summer) and no more than 1% of the migratory (fall/winter) Canada goose population would likely be lethally removed annually by WS in Vermont under the proposed action. In addition WS may remove up to 1,000 nests on an annual basis.

Based on the above information, USFWS oversight, and WS limited lethal take of Canada geese in Vermont, WS should have minimal effects on local, statewide, regional or continental Canada goose populations. Furthermore WS take would contribute positively to the state and Atlantic Flyway Council's resident goose population management goals and objectives.

Other Target Species

Target species, in addition to those analyzed above, have been killed in small numbers by WS during the past year and have included no more than 20 individuals (Table 4-1). Other target species that may be killed or have nests removed during BDM include any of the species listed in Section 1.2. None of these bird species are expected to be taken by WS BDM at any level that would adversely affect overall bird populations. Most of these birds are protected by the USFWS under the Migratory Bird Treaty Act and the take is limited by permit. Therefore, these birds are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds and their nest and eggs, including the USFWS and the VTFW permitting processes. The USFWS, as the agency with management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on these bird populations would have no significant adverse impact on the quality of the human environment.

During Federal Fiscal Year (FY) 2002 (October 2001 through September 2002), the USFWS issued the following depredation permits to Vermont entities to take the following birds to protect property, natural resources, agriculture, and human health and safety:

- Mute swan: two (2) permits allowing take of 20 birds and 10 nests
- Mallard: two (2) permits allowing take of 15 birds and 40 nests
- Black duck: two (2) permits allowing take of 15 birds and 10 nests
- Snow bunting: two (2) permits allowing take of 85 birds and 10 nests
- Barred owl: two (2) permits allowing take of 11 birds and 10 nests
- Great-horned owl: two (2) permits allowing take of 11 birds and 10 nests
- One permit allowing take of 10 birds and 10 nests of the following species: great blue heron, Northern harrier, turkey vulture, broad-winged hawk, red-tailed hawk, American kestrel, killdeer, Northern saw-whet owl, long-eared owl, common barn owl, Eastern screech owl, downy woodpecker, hairy woodpecker, and pileated woodpecker.

Based upon an anticipated increase in future requests for WS assistance, WS predicts that no more than 20 individuals and no more than 20 nests of each of the above mentioned "other target species", with the exception of mute swans, would be lethally removed on an annual basis under the proposed action. Mute swans and any control activities are not currently covered under this EA. In addition, the following 15 raptor species may be trapped and relocated pursuant to permits and other authorizations: broad-winged hawk, rough-legged hawk, red-tailed hawk, red-shouldered hawk, American kestrel, northern harrier, Cooper's hawk, sharp-shinned hawk, Northern goshawk, Northern saw-whet owl, long-eared owl, barred owl, common barn owl, Eastern screech owl, and great-horned owl. Alternatively, WS may be authorized by USFWS "to kill these birds when relocation is not possible."

Based on the above information, USFWS oversight, and WS limited lethal take of these "other bird species" in Vermont, WS should have minimal effects on local, statewide, regional or continental populations.

4.1.1.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would not take any target bird species because no lethal methods would be used. Although WS lethal take of birds would not occur, it is likely that without WS conducting some level of lethal BDM activities for these species, private BDM efforts would increase, leading to potentially similar or even greater effects on target species populations than those of the current program alternative. For the same reasons shown in the population effects analysis in section 4.1.1.2, however, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC-1339 is currently only available for use by WS employees and would not be available for use under this alternative. Effects and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 1, but less than Alternative 4.

4.1.1.4 Alternative 4: No Federal WS Bird Damage Management

Under this alternative, WS would have no impact on target bird populations in the State. Private efforts to reduce or prevent depredations could increase which could result in effects on target species populations to an unknown degree. Effects on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by private persons. For the same reasons shown in the population effects analysis in section 4.1.1.2, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. DRC- 1339 and the tranquilizer alpha-chloralose are currently only available for use by WS employees and would not be available for use under this alternative.

4.1.2 Effects on Other Wildlife Species, including T&E Species

4.1.2.1 Alternative 1: Technical Assistance Only

Adverse Effects on Nontarget Species. Alternative 1 would not allow any WS direct operational BDM in Vermont. Non-target or T&E species would not be impacted by WS activities from this alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 4, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods, leading to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that, similar to Alternative 3 and 4, frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Beneficial Effects on Nontarget Species. The ability to reduce negative impacts caused by birds to wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing control actions. It would be expected that this

alternative would have a greater chance of reducing damage than Alternative 4 since WS would be available to provide information and advice.

4.1.2.2 Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Adverse Effects on Non-target (non-T&E) Species. Direct impacts on nontarget species occur when WS program personnel inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species. Non-target migratory bird species and other non-target wildlife species are usually not affected by WS's management methods, except for the occasional scaring from harassment devices and when WS conducts breeding DCCO management in mixed-species waterbird colonies. In these cases, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action.

There has been no lethal take of non-target species by WS while conducting BDM activities in Vermont. Although it is possible that some non-target birds may be unknowingly killed by use of DRC-1339, the method of application is designed to minimize or eliminate that risk. For example, DRC-1339 treated bait is only applied after a period of pre-baiting with untreated bait material and when non-target birds are not observed coming to feed at the site. WS take of non-target species during BDM activities is expected to be extremely low to non-existent.

WS personnel are experienced and trained in wildlife identification, and to select the most appropriate methods for taking targeted animals and excluding nontarget species. Shooting is virtually 100% selective for the target species; therefore no adverse impacts are anticipated from use of this method. Any non-target species captured in a live trap would be released unharmed on site. No adverse impacts from the use of registered pesticides and repellents are anticipated. Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

While every precaution is taken to safeguard against taking non-target birds, changes in local flight patterns and other unanticipated events can result in the incidental take of unintended species. These occurrences are rare and should not affect the overall populations of any species under the current program.

Beneficial Effects on Non-target Species. This alternative has the greatest possibility of successfully reducing damage and conflicts to wildlife species since all BDM methods could possibly be implemented or recommended by WS.

Programs to control gull and cormorant damage can benefit many other wildlife species that are impacted by their predation or competition for habitat. Gulls are generally very aggressive nesting area colonizers and will force other species such as terns and plovers from prime nesting areas. Greater black-backed gulls are especially aggressive and will kill young terns and other birds. The recent increase in the number of cormorants in the northeast has also impacted colonial bird nesting areas. Besides competing for nesting space, the acidic droppings of cormorants destroy vegetation, making the area unsuitable for rapid nesting colony restoration. Furthermore, control operations as proposed in this alternative could reduce starling impacts to nesting native bird species. Reduction in nest site competition would be a beneficial impact on the native bird species that are adversely affected by interspecific nest competition caused by these birds.

T&E Species Effects. Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures.

Federally Listed Species. WS has consulted with the USFWS under Section 7 of the ESA concerning potential impacts of BDM methods on T&E species and has obtained a Biological Opinion. For the full context of the Biological Opinion, see Appendix F of the ADC Final EIS (USDA 1997, Appendix F). For the preparation of this EA in 2003, WS obtained and reviewed the list of federally listed T&E species for the state of Vermont (Appendix C) and determined that the proposed WS BDM program would not likely adversely affect any T&E species or critical habitat. The USFWS also concurs with this determination (Appendix D)

As stated in the 1992 BO, the USFWS has determined that the only BDM method that might adversely affect the bald eagle was above ground use of strychnine treated bait for "nuisance birds." Strychnine is no longer registered for above ground use and would not be used by WS for BDM in the State. DRC-1339/Starlicide® poses no primary hazard to eagles because eagles do not eat grain or other bait materials on which this chemical might be applied during BDM, and further, because eagles are highly resistant to DRC-1339 - up to 100 mg doses were force fed to captive golden eagles with no mortality or adverse effects noted other than regurgitation and head-shaking (Larsen and Dietrich 1970). Secondary hazards to raptors from DRC-1339/Starlicide® and Avitrol® are low to nonexistent (see Appendix B). Therefore, WS BDM in Vermont is not likely to adversely affect bald eagles.

The USFWS published the final rule to list the Canada lynx on March 24, 2000 (Federal Register, 50 CFR Part 17). The Final Rule identifies the listed population as the "U.S. District Population Segment" which occurs or historically occurred in forested portions of the States of Colorado, Idaho, Maine, Michigan, Minnesota, Montana, New Hampshire, New York, Oregon, Utah, Vermont, Washington, and Wisconsin. WS wildlife biologists consulted on the Canada lynx with USFWS in Regions 3 and 5 in March 2001. The USFWS (letter from L. Lewis, USFWS, Acting Assistant Regional Director to G. Larson, WS Eastern Regional Director, May 9, 2001) determined that, "Canada lynx are unlikely to be affected by using guard dogs, scare devices, oral rabies vaccine, and shooting." While the oral rabies vaccine is not a method identified by the VT WS program for use in bird damage management, the other methods have been identified for potential use. This letter states that a "not likely to adversely affect" determination is appropriate for APHIS-WS operational programs, including those in Vermont.

The USFWS has completed an intra-Service biological evaluation and informal Section 7 consultation on the management of double-crested cormorants in the U.S. and has determined that only the bald eagle, interior least tern (not listed in VT), wood stork (not listed in VT), and piping plover (not listed in VT) could be adversely affected by Cormorant Damage Management (CDM) actions (USFWS 2003b). In accordance with this consultation the following conservation measures would avoid adverse effects on the bald eagle, wood stork, interior least tern and piping plover:

Under the Aquaculture Depredation Order

(i) All CDM control activities are allowed if the activities occur more than 1,500 feet from active wood stork nesting colonies, more than 1,000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks, and if they occur more than 750 feet from an active bald eagle nest.

Under the Public Resource Depredation Order

(i) Discharge/use of firearms to kill or harass double-crested cormorants or use of other harassment methods are allowed if the control activities occur more than 1000 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork

roost sites, and more than 750 feet from feeding wood storks; or occur more than 750 feet from active bald eagle nests;

(ii) Other control activities such as egg oiling, cervical dislocation, CO_2 asphyxiation, egg destruction, or nest destruction are allowed if these activities occur more than 500 feet from active piping plover or interior least tern nests or colonies; occur more than 1500 feet from active wood stork nesting colonies, more than 1000 feet from active wood stork roost sites, and more than 750 feet from feeding wood storks; or occur more than 750 feet from active bald eagle nests;

(iii) To ensure adequate protection of piping plovers, any Agency or their agents who plan to implement control activities that may affect areas designated as piping plover critical habitat in the Great Lakes Region are to make contact with the appropriate Regional Migratory Bird Permit Office prior to implementing control activities.

WS will abide by these conservation measures to avoid adverse impacts to the bald eagle in Vermont.

State Listed Species. WS has obtained and reviewed the list of Vermont State listed T&E species, species of concern, and species of special interest (Appendix E). WS has determined that the proposed WS BDM program is not likely to adversely impact any state listed endangered or threatened species.

Mitigation measures to avoid T&E effects are described in Chapter 3 (Subsection 3.4.2) and are also described in Subsection 4.1.2 of this chapter. The inherent safety features of DRC-1339/Starlicide® and Avitrol® use that preclude or minimize hazards to mammals and plants are described in Appendix B and in a formal risk assessment in the ADC Final EIS (USDA 1997, Appendix P). Those measures and characteristics should assure there would be no jeopardy to T&E species or adverse effects on mammalian or non-T&E bird scavengers from the proposed action.

4.1.2.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Adverse Effects on Nontarget Species. Under this alternative, WS take of non-target animals would hypothetically be less than that of the proposed action because no lethal control actions would be taken by WS. Non-target migratory bird species and other non-target wildlife species are usually not affected by WS's non-lethal management methods, except for the occasional scaring from harassment devices. In these cases, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action. However, if bird damage problems were not effectively resolved by non-lethal control methods, members of the public may resort to other means of lethal control such as the use of shooting or even illegal use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including T&E species. Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Beneficial Effects on Nontarget Species. This alternative would reduce negative impacts caused by birds to wildlife species and their habitats, including T&E species, if non-lethal methods were effective in reducing such damage to acceptable levels. If non-lethal methods were

ineffective at reducing damage to acceptable levels, WS would not be available to conduct or provide advice on any other types of control methods. In these situations it would be expected that bird damage to wildlife species and their habitats would likely remain the same or possibly increase dependent upon actions taken by the affected resource or landowner.

4.1.2.4 Alternative 4: No Federal WS Bird Damage Management

Adverse Effects on Nontarget Species. Alternative 4 would not allow any WS BDM in the State. There would be no impact on non-target or T&E species by WS BDM activities from this alternative. However, private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could impact local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Beneficial Effects on Nontarget Species. The ability to reduce negative impacts caused by birds to wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing control actions.

4.1.3 Effects on Human Health and Safety

4.1.3.1 Safety and Efficacy of Chemical Control Methods

Alternative 1: Technical Assistance Only

Alternative 1 would not allow any direct operational BDM assistance by WS in the State. Concerns about human health risks from WS's use of chemical BDM methods would be alleviated because no such use would occur. DRC-1339 and alpha-chloralose are only registered for use by WS personnel and would not be available for use by private individuals. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and leading to a greater risk than the Proposed Action alternative. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical BDM methods use should be less than under Alternative 4. Commercial pest control services would be able to use Avitrol® and Starlicide® (if it becomes registered for use in VT) and such use would likely occur to a greater extent in the absence of WS's assistance. Use of Avitrol® and Starlicide® in accordance with label requirements should preclude any hazard to members of the public. Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS's controlled use of DRC- 1339 and Avitrol®, could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the Proposed Action alternative.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

DRC-1339. DRC-1339 is the primary lethal chemical BDM method that would be used under the proposed program alternative. Some concern has been generated by a few members of the public that unknown, but significant, risks to human health may exist from DRC-1339 used for BDM.

This chemical is one of the most extensively researched and evaluated pesticides ever developed. Over 30 years of studies have demonstrated the safety and efficacy of this compound. Appendix B provides more detailed information on DRC-1339 and its use in BDM. Factors that virtually eliminate any risk of public health problems from its use are:

- Its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops.

- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours, which means that treated bait material generally is nearly 100% broken down within a week.

- It is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.

- Application rates are extremely low (less than 0.1 lb. of active ingredient per acre) (EPA 1995).

- A human would need to ingest the internal organs of birds found dead from DRC-1339 to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur.

- The EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells) studies, this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995). Notwithstanding, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

The above analysis indicates that human health risks from DRC-1339 use would be virtually nonexistent under any alternative.

Avitrol® (4-Aminopyridine). Avitrol® is another chemical method that might be used by WS in BDM. Appendix B provides more detailed information on this chemical.

Avitrol® is available as a prepared grain bait mixture or as a powder. It is formulated in such a way that ratios of treated baits to untreated baits are no greater than 1:9. Factors that virtually eliminate health risks to members of the public from use of this product as an avicide are:

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (ETOXNET 1996). Therefore, little of the chemical remains in killed birds to present a hazard to humans.

- A human would need to ingest the internal organs of birds found dead from Avitrol® ingestion to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur. Furthermore, secondary hazard studies with mammals and birds have shown that there is virtually no hazard of secondary poisoning.

- Although Avitrol® has not been specifically tested as a cancer-causing agent, the chemical was found not to be mutagenic in bacterial organisms (EPA 1997). Therefore, the best scientific information available indicates it is not a carcinogen. Notwithstanding,

the extremely controlled and limited circumstances in which Avitrol® is used would prevent exposure of members of the public to this chemical.

The above analysis indicates that human health risks from Avitrol® use would be virtually nonexistent under any alternative.

Other BDM Chemicals. Other non-lethal BDM chemicals that might be used or recommended by WS would include repellents such as methyl or di-methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent; anthraquinone which is presently marketed as Flight Control®; and the tranquilizer drug alpha-chloralose. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by the EPA or Food and Drug Administration (FDA). Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment. Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health.

Based on a thorough Risk Assessment, APHIS concluded that, when WS program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

Alternative 3: Non-lethal Bird Damage Management Only by WS

Alternative 3 would not allow for any lethal methods use by WS in the State. WS could only implement non-lethal methods such as harassment and exclusion devices and materials. Non-lethal methods could, however, include Avitrol®, the tranquilizer drug alpha-chloralose and chemical repellents such as anthraquinone and methyl anthranilate. Impacts from WS use of these chemicals would be similar to those described under the proposed action.

Excessive cost or ineffectiveness of non-lethal techniques could result in some entities rejecting WS's assistance and resorting to other means of BDM. Such means could include illegal pesticide uses. Hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS's controlled use of DRC-1339 and Avitrol®, could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the proposed alternative.

Alternative 4: No Federal WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS's use of chemical BDM methods would be alleviated because no such use would occur. DRC- 1339 and alpha-chloralose are only registered for use by WS personnel and would not be available for use by private individuals. Private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Commercial pest control services would be able to use Avitrol® and Starlicide® (if it becomes registered for use in VT) and such use would likely occur to a greater extent in the absence of WS assistance. Use of Avitrol® and Starlicide® in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this alternative if other chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants that, unlike WS's

controlled use of DRC- 1339 and Avitrol®, could pose secondary poisoning hazards to pets. Some chemicals that could be used illegally could present greater risks of adverse effects on humans than those used under the current program alternative.

4.1.3.2 Impacts on Human Safety of Non-chemical BDM Methods

Alternative 1: Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any non-chemical BDM methods. Risks to human safety from WS's use of firearms, traps and pyrotechnics would hypothetically be lower than the Proposed Action alternative, since WS would not be conducting direct control activities. Hazards to humans and property could be greater under this alternative if personnel conducting BDM activities using non-chemical methods are poorly or improperly trained.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Non-chemical BDM methods that might raise safety concerns include shooting with firearms, traps, and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. The Vermont WS program has had no accidents involving the use of firearms, traps or pyrotechnics in which any person was harmed. A formal risk assessment of WS's operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS's use of these methods is expected.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, non-chemical BDM methods that might raise safety concerns include shooting with firearms when used as a harassment technique, traps, and harassment with pyrotechnics. Firearms are only used by WS personnel who are experienced in handling and using them. WS personnel receive safety training on a periodic basis to keep them aware of safety concerns. The Vermont WS program has had no accidents involving the use of firearms, traps or pyrotechnics in which a member of the public or any other person was harmed. A formal risk assessment of WS operational management methods found that risks to human safety were low (USDA 1997, Appendix P). Therefore, no adverse affects on human safety from WS's use of these methods is expected.

Alternative 4: No Federal WS Bird Damage Management

Alternative 4 would not allow any WS BDM in the State. Concerns about human health risks from WS's use of non-chemical BDM methods would be alleviated because no such use would occur. The use of firearms, traps or pyrotechnics by WS would not occur in BDM activities in Vermont. However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Commercial pest control services would be able to use pyrotechnics, traps or firearms in BDM programs and this activity would likely occur to a greater extent in the absence of WS assistance. Hazards to humans and property could be greater under this alternative if personnel conducting BDM activities using non-chemical methods are poorly or improperly trained.

4.1.3.3 Impacts on Human Health and Safety from Birds

Alternative 1: Technical Assistance Only

Potential impacts would be variable. With WS technical assistance but no direct management, entities requesting BDM assistance for human health concerns would either take no action, which means the risk of human health problems would likely continue or increase in each situation as bird numbers are maintained or increased, or implement WS recommendations for non-lethal and lethal control methods. Individuals or entities that implement management actions may or may not have the experience necessary to efficiently and effectively conduct an effective BDM program.

In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. This potential risk would be less likely under this alternative than Alternative 4 when people requesting assistance receive and accept WS technical assistance recommendations.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

People are concerned with potential injury, illness, and loss of human life as a result of the potential impacts of injurious bird species. An Integrated BDM strategy, a combination of lethal and non-lethal means, has the greatest potential of successfully reducing this risk. All BDM methods could possibly be implemented and recommended by WS.

An IWDM approach reduces damage or threats to public health or safety for people who would have no relief from such damage or threats if non-lethal methods were ineffective or impractical. As discussed in Chapter 1, birds are a threat to aviation safety and can also carry or transmit diseases to humans. In most cases, it is difficult to conclusively prove that birds were responsible for transmission of individual human cases or outbreaks of bird-borne diseases. Nonetheless, certain requesters of BDM service may consider this risk to be unacceptable and may request such service primarily for that reason. In such cases, BDM, either by lethal or non-lethal means, would, if successful, reduce the risk of bird-borne disease transmission at the site for which BDM is requested.

In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. In such cases, lethal removal of the birds may actually be the best alternative from the standpoint of overall human health concerns in the local area. If WS is providing direct operational assistance in relocating birds, coordination with local authorities may be conducted to assure they do not reestablish in other undesirable locations.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would be restricted to implementing and recommending only non-lethal methods in providing assistance with bird damage problems. The success or failure of the use of non-lethal methods can be quite variable. In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. Some requesting entities, such as city government officials, would reject WS assistance for this reason and would likely seek to achieve bird control by other means. However, if WS is providing direct operational assistance in relocating birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

Alternative 4: No Federal WS Bird Damage Management

Potential impacts would be variable. With no WS assistance, cooperators would be responsible for developing and implementing their own BDM program. Cooperator efforts to reduce or prevent conflicts could result in less experienced persons implementing control methods, therefore leading to a greater potential of not reducing bird hazards, than under the proposed action.

In some situations the implementation of non-lethal controls such as electric or porcupine wires, netting barriers, and harassment could actually increase the risk of human health problems at other sites by causing the birds to move to other urban roosting sites not previously affected. Under this alternative, human health problems could increase if private individuals were unable to find and implement effective means of controlling birds that cause damage problems.

4.1.4 Impacts to Stakeholders, including Aesthetics

4.1.4.1 Effects on Human Affectionate Bonds with Individual Birds and on Aesthetic Values of Wild Bird Species

Alternative 1: Technical Assistance Only

Under this alternative, WS would not conduct any direct operational BDM, but would still provide technical assistance or self-help advice to persons requesting assistance with bird damage. Additionally, WS would not conduct any harassment of birds that were causing damage. Those who oppose direct operational assistance in wildlife damage management by the government, but favor government technical assistance, would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS's activities under this alternative because the individual birds would not be killed by WS. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the Proposed Action alternative.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Those who routinely view or feed individual birds would likely be disturbed by removal of such birds under the current program. WS is aware of such concerns and takes these concerns into consideration to mitigate effects. WS may be able to mitigate such concerns by leaving certain birds that have been identified by interested individuals.

Some members of the public have expressed opposition to the killing of any birds during BDM activities. Under this Proposed Action alternative, some lethal control of birds would occur and these persons would be opposed. However, many persons who voice opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS's lethal control activities. Lethal control actions would generally be restricted to local sites and to small, unsubstantial percentages of overall populations. Therefore, the species subjected to limited lethal control actions would remain common and abundant and would, therefore, continue to remain available for viewing by persons with that interest.

Lethal removal of birds from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access. The ability to view and interact with birds at these sites is usually either restricted to viewing from a location outside boundary fences or is forbidden.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would not conduct any lethal BDM, but may conduct harassment of birds that are causing damage. Some people who oppose lethal control of wildlife by the government, but are tolerant of government involvement in non-lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by the death of individual birds under this alternative, but might oppose dispersal or translocation of certain birds. WS may be able to mitigate such concerns by leaving certain birds that have been identified by interested individuals. In addition, the abundant populations of target bird species in urban environments would enable people to continue to view them and to establish affectionate bonds with individual wild birds. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

Alternative 4: No Federal WS Bird Damage Management

Under this alternative, WS would not conduct any lethal removal of birds nor would the program conduct any harassment of birds. Those in opposition of any government involvement in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS's activities under this alternative. However, other private entities would likely conduct BDM activities similar to those that would no longer be conducted by WS, which means the effects would then be similar to the proposed action alternative.

4.1.4.2 Effects On Aesthetic Values of Property Damaged by Birds

Alternative 1: Technical Assistance Only

Under this alternative, the lack of operational assistance in reducing bird problems could result in an increase of potential adverse affects on aesthetic values. However, potential adverse affects would likely be less than as those under Alternative 4, since WS would be providing technical assistance.

Relocation of nuisance roosting or nesting populations of birds (e.g., starling roosts) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS has only provided technical assistance to local residents or municipal authorities, coordination with local authorities to monitor the birds' movements to assure the birds do not reestablish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

Alternative 2: Integrated Bird Damage Management Program (Proposed Action/No Action)

Under this alternative, operational assistance in reducing bird problems, in which droppings from the birds cause an unsightly mess, would improve aesthetic values of affected properties. In addition, individuals objecting to the presence of invasive nonnative species, such as European starlings, domestic feral pigeons, and House sparrows, and whose aesthetic enjoyment of other birds is diminished by the presence of such species, will be positively affected by programs which result in reductions in the presence of such birds.

Relocation or dispersal of nuisance roosting or nesting populations of birds (e.g., starling roosts) by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, WS would be restricted to non-lethal methods only. Assuming property owners would choose to allow and pay for the implementation of these non-lethal methods, this alternative could result in birds relocating to other sites where they would likely cause or aggravate similar problems for other property owners. Thus, this alternative would likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the Proposed Action alternative.

Relocation or dispersal of nuisance roosting or nesting populations of birds (e.g., starling roosts) by harassment can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities may be conducted to assure they do not re-establish in other undesirable locations.

Alternative 4: No Federal WS Bird Damage Management

Under this alternative, the lack of any operational or technical assistance in reducing bird problems would mean aesthetic values of some properties would continue to be adversely affected if the property owners were not able to achieve BDM some other way. In many cases, this type of aesthetic damage would worsen because property owners would not be able to resolve their problems.

Relocation of nuisance roosting or nesting population of birds (e.g., starling roosts) through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. Coordination of dispersal activities by local residents with local authorities to monitor the birds' movements to assure the birds do not re-establish in other undesirable locations might not be conducted, thereby increasing the potential of adverse effects to nearby property owners.

4.1.5 Humaneness and Animal Welfare Concerns of Methods Used

4.1.5.1 Alternative 1: Technical Assistance Only

Under this alternative, WS would provide self-help advice only. Thus, lethal methods, viewed as inhumane by some persons, would not be used by WS. Without WS direct operational assistance, it is expected that many requesters of BDM would reject non-lethal recommendations or would not be willing to pay the extra cost of implementing and maintaining them and would seek alternative lethal means. Similar to Alternative 3, DRC-1339 would no longer be available as it is only registered for use by or under the direct supervision of WS personnel. Thus, the only chemical BDM methods legally available would be Avitrol® and Starlicide® (if it becomes registered for use in VT). The use of Avitrol® may be viewed by many persons as less humane than DRC-1339 or Starlicide®. Improper or illegal use of both chemicals would likely be viewed as inhumane by the public. Similar to the proposed action, shooting and live trapping/capture and euthanization by decapitation, capture and processing for human consumption, egg treatments, cervical dislocation, or CO_2 gas could be used by these entities. Overall, BDM under this alternative would likely be somewhat less humane than the Proposed Action alternative, but slightly more humane than Alternative 4.

4.1.5.2 Alternative 2: Implement an Integrated Bird Damage Management Program (Proposed Action/No Action)

Under this alternative, methods viewed by some persons as inhumane would be used in BDM by WS. These methods would include capture and euthanasia, capture and relocate, capture and

processing for human consumption, egg treatments, immobilization with the use of AC, shooting and toxicants/chemicals such as DRC-1339 and Avitrol®.

Shooting, when performed by experienced professionals, usually results in a quick death for target birds. Occasionally, however, some birds are initially wounded and must be shot a second time or must be caught by hand and then dispatched or euthanized. Some persons would view shooting as inhumane.

Some people could also be concerned about eggs being oiled, punctured, chilled, or addled. Some individuals may consider the treatment of eggs as inhumane.

The primary lethal chemical BDM method that would be used by WS under this alternative would be DRC-1339. This chemical causes a quiet and apparently painless death resulting from uremic poisoning and congestion of major organs (Decino et al. 1966). The birds become listless and lethargic, and a quiet death normally occurs in 24 to 72 hours following ingestion. However, the method appears to result in a less stressful death than that which probably occurs by most natural causes, such as by disease, starvation, or predation. For these reasons, WS considers DRC-1339 use to be a relatively humane method of lethal BDM. However, despite the apparent painlessness of the effects of this chemical, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable.

The chemical Avitrol® repels birds by poisoning a few members of a flock, causing them to become hyperactive. Their distress calls generally alarm the other birds and cause them to leave the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. The affected birds generally die. In most cases where Avitrol® is used, only a small percentage of the birds are affected and killed by the chemical with the rest being merely dispersed. In experiments to determine suffering, stress, or pain in affected animals, Rowsell et. al. (1979) tested Avitrol® on pigeons and observed subjects for clinical, pathological, or neural changes indicative of pain or distress. None were observed. Conclusions of the study were that the chemical met the criteria for a humane pesticide. Notwithstanding, some persons would view Avitrol® as inhumane treatment of the birds that are affected by it based on the birds' distress-like behavior.

Occasionally, birds captured alive by use of the tranquilizer Alpha-chloralose, cage traps, by hand, or with nets would be euthanized. The most common method of euthanization would be by CO_2 gas, cervical dislocation, or other methods which are described and approved by AVMA as humane euthanasia methods (Beaver et al. 2001). Most people would view AVMA-approved euthanization methods as humane.

There would likely be concern among stakeholders, in situations where Canada geese are captured and euthanized or captured and processed for human consumption, that the birds should be killed quickly. Many stakeholders would want Canada geese captured in a way that results in no pain or a minimization of pain, which they could measure as physical injury (e.g., bleeding, broken wing). Captured birds would be made as comfortable as possible by watering the birds as necessary, not overcrowding the birds if they are put in holding crates for transportation, and seeking shade for caged birds as necessary. Geese would be processed for human consumption in state licensed poultry processing facilities in accordance with all pertinent regulations.

Some people have concerns over the potential for separation of goose family groups through management actions. This could occur through harassment (e.g., pyrotechnics, dogs), relocation, and lethal control methods. However, it is not uncommon for goose family units to experience change. Bellrose (1980) cites several sources which list annual mortality rates of juvenile Canada geese ranging from 7 to 19% during the hatching to fledging stage. Biologists believe that juvenile geese have a good likelihood of survival without adult geese once the juvenile reaches

fledging stage, which occurs by July for most juvenile geese. Therefore, molting juvenile geese that escape capture or relocated would most likely survive to adulthood (Mississippi Flyway Council Technical Section 1996). Separated adults form new pair bonds and readily breed with new mates (Moser et al. 1991).

4.1.5.3 Alternative 3: Non-lethal Bird Damage Management Only by WS

Under this alternative, lethal methods, viewed as inhumane by some persons, would not be used by WS. However, it is expected that many requesters of BDM assistance would reject non-lethal methods recommended by WS and/or would not be willing to pay the extra cost of implementing and maintaining them and would seek alternative lethal means. DRC-1339 would not be available to non-WS entities; however, Avitrol® and Starlicide® (if it becomes registered for use in VT) would be legal for use by certified pest control operators. Avitrol® could be used or recommended by WS under this alternative. Avitrol® would most likely be viewed as less humane than DRC-1339 or Starlicide® because of the distress behaviors that it causes. Shooting could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane. Live trapping/capture and euthanization by decapitation, capture and processing for human consumption, egg treatments, cervical dislocation, or CO_2 gas could also be used by these entities.

4.1.5.4 Alternative 4: No Federal WS Bird Damage Management

Under this alternative, methods viewed as inhumane by some persons would not be used by WS. Similar to Alternatives 1 and 3, DRC-1339 would no longer be available for use since it is only registered for use by or under the direct supervision of WS personnel. However, Avitrol® and Starlicide® (if it becomes registered for use in VT) would be legal for use by certified pest control operators. Avitrol® would most likely be viewed as less humane than DRC-1339 or Starlicide® because of the distress behaviors that it causes. Shooting could be used by non-WS entities and, similar to the proposed action alternative, would be viewed by some persons as inhumane. Live trapping/capture and euthanasia by decapitation, capture and processing for human consumption, egg treatments, cervical dislocation, or CO_2 gas could also be used by these entities.

4.2 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 other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time.

Under Alternatives 1, 2 and 3, WS would address damage associated with birds in a number of situations throughout the State. The WS BDM program would be the primary federal program with BDM responsibilities; however, some state and local government agencies may conduct BDM activities in Vermont as well. Through ongoing coordination with these agencies, WS is aware of such BDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct BDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct BDM activities in the same area. The potential cumulative impacts analyzed below could occur either as a result of WS BDM 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

Bird Damage Management methods used or recommended by the WS program in Vermont will likely have no cumulative adverse effects on target and non-target wildlife populations. WS limited lethal take of target bird species is anticipated to have minimal impacts on target bird populations in Vermont, the region, and the U.S. When control actions are implemented by WS the potential lethal take of non-target wildlife species is expected to be minimal to non-existent.

Cumulative Impact Potential from Chemical Components

BDM programs which include the use of pesticides as a lethal population management component may have the greatest potential for cumulative impacts on the environment as such impacts relate to deposit of chemical residues in the physical environment and environmental toxicosis. The avicides, DRC-1339 and Starlicide®, and the frightening agent, Avitrol, are the only chemicals used or recommended by the Vermont WS BDM program for the purpose of obtaining lethal effects on birds. These chemicals have been evaluated for possible residual effects which might occur from buildup of the chemicals in soil, water, or other environmental sites.

> ***DRC-1339*** exhibits a low persistence in soil or water, and bioaccumulation of the chemical is unlikely (USDA 1997). Additionally, the relatively small quantity of DRC-1339 that will be used in BDM programs in Vermont, the chemical's instability which results in speedy degradation of the product, and application protocol used in WS programs further reduces the likelihood of any environmental accumulation. DRC-1339 is not used by any other entities in Vermont.
>
> ***Starlicide®*** is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, the cumulative impact potential from Starlicide® use should be similar to DRC-1339.
>
> ***Avitrol®*** may be used or recommended by the Vermont WS program. Most applications would not be in contact with soil, applications would not be in contact with surface or ground water, and uneaten baits will be recovered and disposed of according to EPA label specifications. Avitrol® exhibits a high persistence in soil and water but, according to literature, does not bioaccumulate (USDA 1997 and EXTOXNET 2000). Because of Avitrol's characteristic of binding to soils, it is not expected to be present in surface or ground water as a result of its use on land (EPA 1980). A combination of chemical characteristics and baiting procedures used by WS would reduce the likelihood of environmental accumulation of Avitrol. The EPA has not required studies on the fate of Avitrol® in the soil because, based on use patterns of the avicide, soil residues are expected to be low (EPA 1980).

Based on use patterns, the chemical and physical characteristics of DRC-1339, Starlicide®, and Avitrol, and factors related to the environmental fate of these pesticides, no cumulative impacts are expected from the lethal chemical components used or recommended by the WS BDM program in Vermont.

Non-lethal chemicals may also be used or recommended by the WS BDM program in Vermont. Characteristics of these chemicals and use patterns indicate that no significant cumulative impacts related to environmental fate are expected from their use in WS BDM programs in Vermont.

Cumulative Impact Potential from Non-chemical Components

Non-chemical methods used or recommended by WS BDM program may include exclusion through use of various barriers, habitat modification of structures or vegetation, live trapping and translocation or euthanasia of birds, nest and egg destruction, harassment of birds or bird flocks, and shooting.

Because shooting may be considered as a component of the non-chemical, the deposition of lead shot in the environment is a factor considered in this EA.

Lead Shot. Threats of lead toxicosis to waterfowl from the deposition of lead shot in waters where such species fed were observed more than one hundred years ago (Sanderson and Belrose 1986). As a result of discoveries made regarding impacts to several species of ducks and geese, federal restrictions were placed on the use of lead shot for waterfowl hunting in 1991. "Beginning September 1, 1991, the contiguous 48 United States, and the States of Alaska and Hawaii, the Territories of Puerto Rico and the Virgin Islands, and the territorial waters of the United States, are designated for the purpose of Sec. 20.21 (j) as nontoxic shot zones for hunting waterfowl, coots, and certain other species. 'Certain other species' refers to those species, other than waterfowl or coots, affected by reason of being included in aggregate bags and concurrent seasons." Alll WS BDM shooting activities conform to federal, state and local laws. If activities are conducted near or over water, WS uses nontoxic shot during activities. Consequently, no deposition of lead in nontoxic shot zones is likely to occur as a result of WS BDM actions in Vermont. Therefore, cumulative impacts are not likely to occur if toxic shot is used. Additionally, WS will evaluate other BDM actions which entail the use of shot on a case by case basis to determine if deposition of lead shot poses any risk to non-target animals, such as domestic livestock. If such risk exists, WS will use nontoxic shot in those situations.

Roost Harassment/Relocation. Some potential exists for cumulative impacts to human health and safety related to the harassment of roosting bird flocks such as European starlings in urban and suburban environments. If birds are dispersed from one site and relocated 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.

SUMMARY

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the Proposed Action, the lethal removal of birds by WS would not have a significant impact on overall target bird populations in Vermont, but some local reductions may occur. No risk to public safety is expected when WS's services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, since only trained and experienced wildlife biologists/specialists would conduct and recommend BDM activities. There is a slight increased risk to public safety when persons who reject WS assistance and recommendations in Alternatives 1, 2 and 3 and conduct their own BDM activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS's participation in BDM activities on public and private lands within the state of Vermont, the analysis in this EA indicates that WS Integrated BDM program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 4-4 summarizes the expected impact of each of the alternatives on each of the issues.

Table 4-4. Summary of Potential Impacts.

Issue	Alternative 1 Technical Assistance Only	Alternative 2 Integrated Bird Damage Management Program (Proposed Action/No Action)	Alternative 3 Nonlethal BDM Only by WS	Alternative 4 No Federal WS BDM Program
1. Effects on Target Species Effects	No effect by WS. Low effect - reductions in local target bird numbers by non-WS personnel likely; would not significantly affect state and regional populations.	Low effect - reductions in local target bird numbers; would not significantly affect state and regional populations	No effect by WS. Low effect - reductions in local target bird numbers by non-WS personnel likely; would not significantly affect state and regional populations.	No effect by WS. Low effect - reductions in local target bird numbers by non-WS personnel likely; would not significantly affect state and regional populations
2. Effects on Other Wildlife Species, Including T&E Species	No effect by WS. Impacts by non-WS personnel would be variable.	Low effect - methods used by WS would be highly selective with very little risk to non-target species.	Low effect - methods used by WS would be highly selective with very little risk to non-target species.	No effect by WS. Impacts by non-WS personnel would be variable.
3. Effects on Human Health and Safety	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater potential of not reducing bird damage than under the proposed action.	The proposed action has the greatest potential of successfully reducing this risk. Low risk from methods used by WS.	Impacts could be greater under this alternative than the proposed action. Low risk from methods used by WS.	Efforts by non-WS personnel to reduce or prevent conflicts could result in less experienced persons implementing control methods, leading to a greater potential of not reducing bird damage than under the proposed action.
4a. Aesthetic Values of Wild Bird Species	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state target bird populations.	Low to moderate effect at local levels; Some local populations may be reduced; WS bird damage management activities do not adversely affect overall regional or state target bird populations.	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase when non-lethal methods are ineffective unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state target bird populations.	Low to moderate effect. Local bird numbers in damage situations would remain high or possibly increase unless non-WS personnel successfully implement lethal methods; no adverse affect on overall regional and state target bird populations.
4b. Aesthetic Values of Property Damaged by Birds	Moderate to High effect - birds may move to other sites which can create aesthetic damage problems at new sites.	Low effect - bird damage problems most likely to be resolved without creating or moving problems elsewhere.	Moderate to High effect - birds may move to other sites which can create aesthetic damage problems at new sites. Less likely than Alt. 1 and 4.	High effect - bird problems less likely to be resolved without WS involvement. Birds may move to other sites which can create aesthetic damage problems at new sites
5. Humaneness and Animal Welfare Concerns of Methods Used	No effect by WS. Impacts by non-WS personnel would be variable.	Low to moderate effect - methods viewed by some people as inhumane would be used by WS.	Lower effect than Alt. 2 since only non-lethal methods would be used by WS	No effect by WS. Impacts by non-WS personnel would be variable.

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APPENDIX A
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APPENDIX B

BIRD DAMAGE MANAGEMENT METHODS AVAILABLE FOR USE OR RECOMMENDATION BY THE VERMONT WILDLIFE SERVICES PROGRAM

NON-LETHAL, NON-CHEMICAL METHODS

Agricultural producer and property owner practices. These consist primarily of non-lethal preventive methods such as cultural methods and habitat modification. Cultural methods and other management techniques are implemented by the agricultural producer or property owners/managers. Resource owners/managers may be encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality. These methods include:

> **Cultural methods.** Cultural methods may include altering planting dates so that crops are not young and vulnerable to damage when the damage-causing species are present, or the planting of crops that are less attractive or less vulnerable to such species. At feedlots or dairies, cultural methods generally involve modifications to the level of attention given to livestock, which may vary depending on the age and size of the livestock. Animal husbandry practices include, but are not limited to, techniques such as night feeding, indoor feeding, closed barns or corrals, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994).
>
> **Environmental/Habitat modification** can be an integral part of BDM. Wildlife production and/or presence is directly related to the type, quality, and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain bird species or to repel certain birds. In most cases, the resource or property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of BDM strategies at or near airports to reduce bird-aircraft strike hazards by eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport properties can be minimized through management of vegetation and water from areas adjacent to aircraft runways. Habitat management is often necessary to minimize damage caused by starlings that form large roosts during late autumn and winter. Bird activity can be greatly reduced at roost sites by removing all the trees or selectively thinning the stand.
>
> **Modify Human Behavior.** Artificial feeding of birds by people attracts and sustains more birds in an area than could be supported by natural food supplies. This unnatural food source exacerbates damage by birds, especially resident Canada geese. The elimination of feeding of Canada geese is a primary recommendation made by WS, and many local municipalities and homeowners associations have adopted policies and ordinances prohibiting it. Some parks have posted signs, and there have been efforts made to educate the public on the negative aspects of feeding Canada geese. However, sometimes people do not comply, and the policies are poorly enforced in some areas.
>
> **Alter Aircraft Flight Patterns:** In cases where the presence of birds at airports results in threats to human safety, and when such problems cannot be resolved by other means, the alteration of aircraft flight patterns or schedules may be recommended. However, altering operations at airports to decrease the potential for hazards is not feasible unless an emergency situation exists. The expense of interrupted flights and the limitations of existing facilities make this practice prohibitive.

Animal behavior modification. This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may involve use of scare tactics or fencing to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some of the methods included in this category are:

- Bird-proof barriers

- Electronic guards
- Propane exploders
- Pyrotechnics
- Distress Calls and sound producing devices
- Chemical frightening agents
- Repellents
- Scare crows/Effigies
- Mylar tape
- Lasers
- Eye-spot balloons

These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium-filled eye-spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective, but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Graves and Andelt 1987, Mott 1985, Shirota et al. 1983, Conover 1982, Arhart 1972). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988).

Bird proof barriers can be effective, but are often cost-prohibitive as the aerial mobility of birds usually requires overhead barriers as well as peripheral fencing or netting. Exclusionary devices, adequate to stop bird movements, can also restrict movements of livestock, people and other wildlife (Fuller-Perrine and Tobin 1993). Netting can be used to exclude birds from a specific area by the placement of bird-proof netting over and around the specific resource to be protected. Exclusion may be impractical in most settings (e.g., commercial agriculture); however, it can be practical in small areas (e.g., personal gardens) or for high-value crops (e.g., grapes) (Johnson 1994). Although this alternative would provide short-term relief from damage, it may not completely deter birds from feeding, loafing, staging, or roosting at that site. The public often finds exclusionary devices, such as netting, unsightly and fear the devices will lower the aesthetic value of the neighborhood when used over personal gardens.

Barrier Fence. The construction or placement of physical barriers has limited application for geese. The application of this method is limited to areas that can be completely enclosed and do not allow geese to land inside enclosures. Barriers can be temporary or permanent structures. Lawn furniture/ornaments, vehicles, boats, snow fencing, plastic hazard fencing, metal wire fencing, and multiple strand fencing have all been used in to limit the movement of resident geese.

Auditory scaring devices such as propane exploders, pyrotechnics, electronic guards, scarecrows, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. These devices are sometimes effective, but usually only for a short period of time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota and Masake 1983, and Arhart 1972). Williams (1983) reported an approximate 50% reduction in blackbirds at two south Texas feedlots as a result of pyrotechnics and propane cannon use. However, these devices are often not practical in dairy or feedlot situations because of the disturbance to livestock, although livestock can generally be expected to habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Visual scaring techniques such as the use of mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly give birds a visual cue that a large predator is present), flags, lasers, and effigies, are occasionally effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et.al. 1986, and Tobin et.al. 1988). Birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics. For example, the use of effigies (either a carcass or a taxidermic preparation) as a component of an integrated vulture damage management program, contributes to the success of vulture roost dispersal activities (Humphrey et al. 2001, Tillman et al. 2002, and Avery et al. 2002). Effigies are hung upside down as high as possible in roost trees or from specially constructed masts

to disperse vultures. A migratory bird permit is required from the USFWS before a vulture may be taken to use as an effigy or to salvage a dead vulture (e.g., road killed bird) to use as an effigy.

Lasers are a non-lethal technique recently evaluated by the USDA, APHIS, WS, National Wildlife Research Center (NWRC) (Blackwell et al. 2002, Glahn et al. 2000). For best results and to disperse numerous birds from a roost, the laser is most effectively used in periods of low light, such as after sunset and before sunrise. In the daytime, the laser can also be used during overcast conditions or in shaded areas to move individual and small numbers of birds, although the effective range of the laser is much diminished. Blackwell et al. (2002) tested lasers on several bird species and observed varied results among species. Long-legged wading birds, like great blue herons, have also been successfully dispersed using low-powered laser light. This discovery is especially important to aquaculture producers because it gives them another non-lethal tool for combating the heron, the double-crested cormorant, and other fish-eating birds (Glahn et al. 2000). Lasers were ineffective at dispersing pigeons and mallards with birds habituating in approximately 5 minutes and 20 minutes, respectively (Blackwell et al. 2002). WS field applications of lasers have determined that blackbirds, starlings, and pigeons generally do not respond to low-powered lasers, while crows, gulls, herons, and some waterfowl species do respond. As with other BDM tools, lasers are most effective when used as part of an integrated management program.

Live traps. These consist of traps used to capture animals alive. Captured birds may be subsequently killed by other legal methods. In some cases, birds caught in live traps are relocated away from the original trapping site. Relocation to other areas following live capture would not generally be effective because problem bird species are highly mobile and can easily return to damage sites from long distances; habitats in other areas are generally already occupied; and relocation would most likely result in bird damage problems at the new location. Relocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, difficulties in adapting to new locations or habitats, and the likelihood that relocated birds will become involved in damage situations at or near the release site.

Decoy traps are used by WS for preventive and corrective damage management. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds of the same species that are being targeted are usually placed in the trap with sufficient food and water to assure their survival. Perches are configured in the trap to allow birds to roost above the ground and in a more natural position. Feeding behavior and calls of the decoy birds attract other birds which enter and become trapped themselves. Active decoy traps are monitored daily, every other day, or as appropriate, to remove and euthanize excess birds and to replenish bait and water. Decoy traps and other cage/live traps, as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Nest box traps may be used by WS for corrective damage management and are effective in capturing local breeding and post breeding European starlings and other targeted secondary cavity nesting birds (DeHaven and Guarino 1969, Knittle and Guarino 1976). Trapped birds are euthanized.

Mist nets are more commonly used for capturing small-sized birds such as House sparrows and finches, but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller hawks and owls. This method was introduced into the United States in the 1950's from Asia and the Mediterranean where it was used to capture birds for the market (Day et al. 1980). The mist net is a fine black silk or nylon net, usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net. Special consideration will be given to any mist net use in the Lake Champlain watershed of Vermont to avoid any unintentional capture of the endangered Indiana bat (*Myotis sodalis*). To avoid the unintentional capture of bats, mist nets will only be deployed during daylight hours and not deployed after dark without special consideration for the presence of bats.

Cannon nets are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless during the molt and other birds which are typically shy to other types of capture.

Swedish goshawk traps are large cage type traps used for catching large birds of prey such as hawks and owls. These traps are two part traps with live bait (pigeons, rabbits, or starlings) placed in the lower section. The birds of prey are captured when they investigate the prey and perch on the trigger bar causing them to fall into the upper portions of the trap, which closes around the bird.

Bal-chatri traps are small traps used for capturing birds of prey such as hawks and owls. Live bait such as pigeons, starlings, rodents, etc. are used to lure raptors into landing on the trap (Hygnstrom and Craven 1994) where nylon nooses entangle their feet and hold the bird. The trap is made of chicken wire or other wire mesh material which is formed into a Quonset hut-shaped cage that holds the live bait. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string.

Bow nets are small circular net traps used for capturing birds. The nets are hinged and spring loaded so that when the trap is set it resembles a half moon. The net is set over a food source and it triggered by an observer using a pull cord.

Hand nets are used to catch birds in confined areas such as homes and businesses. These nets resemble fishing dip nets with the exception that they are larger and have long handles.

Net guns project a net over at target using a specialized gun.

Panel nets are most often used to capture birds that are unable to fly, such as waterfowl during molting periods. Panel nets as described by Costanzo et al. (1995) are lightweight, portable panels (4' x 8') that are used to herd and surround geese into a moveable catch pen. This method is used to capture birds on a variety of surfaces, and can be employed in such a way as to reduce stress on captured birds (placement in the shade).

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle or the removal of completed nests that do not contain eggs. Nest destruction is generally applied when dealing with a small number of birds. This method is used to discourage birds from constructing nests in areas which may create nuisances and human safety problems for home and business owners. Heusmann and Bellville (1978) reported that nest removal was an effective, but time-consuming method because problem bird species are generally abundant and highly mobile and can easily return to damage sites from long distances. The extent to which birds rebuild nests can be reduced by instructing homeowners to install physical barriers to discourage nest building. This method poses no imminent danger to pets or the public.

Egg addling/destruction is a method of suppressing reproduction in local bird populations by destroying egg embryos prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times, causing detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen (see *Egg oiling* below). Egg addling and destruction is a valuable damage management tool and has proven effective in some applications.

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

Relocation of damaging birds to other areas following live capture generally would not be effective nor cost-effective. Relocation to other areas following live capture would not generally be effective because problem bird species are mobile and can easily return to damage sites from long distances, habitats in other areas are generally already occupied, and relocation would most likely result in bird damage problems at the new location. Relocation of wildlife is also discouraged by WS policy (WS Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats. However, there may be exceptions for the relocation of damaging birds when the birds are considered to have high value such as raptors and T&E species. In these cases, WS would consult with the USFWS and/or VTFW to coordinate capture, transportation, and selection of suitable relocation sites.

Removal of Domestic Waterfowl: Flocks of urban waterfowl are known to act as "decoys" and attract migrating waterfowl (Crisley et al. 1968, Woronecki 1992, AAWV undated). Rabenold (1987) and Avery (1994) reported that birds learn to locate food resources by watching the behavior of other birds. The removal of domestic waterfowl from ponds removes birds that act as "decoys" in attracting waterfowl. Property or resource owners may be reluctant to remove some or all decoy birds because of the enjoyment of their presence.

Dogs: Dogs can be effective at harassing geese and keeping them off turf and beaches (Conover and Chasko 1985, Castelli and Sleggs 1998). Around water, this technique appears most effective when the body of water to be patrolled is less than two acres in size (Swift 1998). Although dogs can be effective in keeping geese off individual properties, they do not contribute to a solution for the larger problem of overabundant goose populations (Castelli and Sleggs 1998). Swift (1998) reported that when harassment with dogs ceases, the number of geese return to pre-treatment numbers. WS recommends and encourages the use of dogs where appropriate.

NON-LETHAL, CHEMICAL METHODS

Avitrol® is a chemical frightening agent (repellent) that is effective in a single dose when mixed with untreated baits, normally in a 1:9 ratio. Avitrol, however, is not completely non-lethal in that a small portion of the birds are generally killed (Johnson and Glahn 1994). Prebaiting is usually necessary to achieve effective bait acceptance by the target species. This chemical is registered for use on pigeons, crows, gulls, blackbirds, starlings, and House sparrows in various situations. Avitrol® treated bait is placed in an area where the targeted birds are feeding. Usually, a few birds will consume the treated bait and become affected by the chemical. The affected birds then broadcast distress vocalizations and display abnormal flying behavior, thereby frightening the remaining flock away.

Avitrol® is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations where only a small portion of the individual grains carry the chemical. Avitrol® products are registered by the manufacturer, with the Vermont Agency of Agriculture, Food and Market's Plant Industry Division. It can be used anytime of the year, but is used most often during winter and spring. Any granivorous bird associated with the target species could be affected by Avitrol. Avitrol® is water soluble, but laboratory studies have demonstrated that Avitrol® is strongly absorbed onto soil colloids and has moderately low mobility. Biodegradation is expected to be slow in soil and water, with a half-life ranging from three to 22 months. However, Avitrol® may form covalent bonds with humic materials, which may serve to reduce its availability for intake by organisms from water. It is non-accumulative in tissues and is rapidly metabolized by many species (Schafer 1991).

Avitrol® is acutely toxic to avian and mammalian species; however, blackbirds are more sensitive to the chemical and there is little evidence of chronic toxicity. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appear to have been affected (Schafer 1991). However, a laboratory study by Schafer et al. (1974) showed that magpies exposed to two to 3.2 times the published Lethal Dose (LD_{50}) in contaminated prey for 20 days were not adversely affected and three American kestrels that were fed contaminated blackbirds for seven to 45 days were not adversely affected. Some hazards may occur to predatory species consuming unabsorbed chemical in the gastro-intestinal tract of affected or dead birds (Holler and Shafer 1982, Schafer 1981). A formal Risk Assessment found no probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for non-target indicator species tested on this compound (USDA 1997, Appendix P).

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) (artificial grape flavoring food additive) has been shown to be a promising repellent for many bird species (Dolbeer et al. 1993). Cummings et al. (1995) found effectiveness of MA declined significantly after 7 days. Belant et al. (1996) found MA ineffective as a bird grazing repellent, even when applied at triple the recommended label rate. MA is also under investigation as a potential bird taste repellent. MA may become available for use as a livestock feed additive (Mason et al. 1984; Mason et al. 1989). It is registered for applications to turf or to surface water areas used by unwanted birds. The material has been shown to be nontoxic to bees (LD_{50} > 25 micrograms/bee[4]), nontoxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[5]), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992; RJ Advantage, Inc. 1997). It has been listed as "Generally Recognized as Safe" (GRAS) by the FDA (Dolbeer et al. 1992).

Water surface and turf applications of MA are generally considered expensive. For example, the least intensive application rate required by label directions is 20 lbs. of product (8 lbs. active ingredient) per acre of surface water at a cost of about $64/lb., with retreatment required every 3-4 weeks (RJ Advantage, Inc. 1997). The cost of treating turf areas would be similar on a per acre basis. Also, MA completely degrades in about 3 days when applied to water (RJ Advantage, Inc. 1997), which indicates the repellent effect is short-lived.

Another potentially more cost-effective method of MA application is by use of a fog-producing machine (Vogt 1997). The fog drifts over the area to be treated and is irritating to the birds while being non-irritating to any humans that might be exposed. Fogging applications must generally be repeated 3-5 times after the initial treatment before the birds abandon a treatment site (Dr. P. Vogt, RJ Advantage, Inc., Pers. Comm. 1997). Applied at a rate of about .25 l./acre of water surface, the cost is considerably less than when using the turf or water treatment methods.

MA is also being investigated as a livestock feed additive to reduce or prevent feed consumption by birds. Such chemicals undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or the FDA.

Particulate feed additives have been investigated for their bird-repellent characteristics. In pen trials, European starlings rejected grain to which charcoal particles were adhered (L. Clark, NWRC, Pers. Comm. 1999). If further research finds this method to be effective and economical in field application, it may become available as a bird repellent on livestock feed. Charcoal feed additives have been explored for use in reducing methane production in livestock and should have no adverse effects on livestock, on meat or milk production, or on human consumers of meat or dairy products (L. Clark, NWRC, Pers. Comm. 1999).

Other chemical repellents. A number of other chemicals have shown bird repellent capabilities. Anthraquinone, a naturally occurring chemical found in many plant species and in some invertebrates as a natural predator defense mechanism, has shown effectiveness in protecting rice seed from red-winged blackbirds and boat-tailed grackles (Avery et al. 1997). It has also shown effectiveness as a foraging repellent against Canada goose grazing on turf and as a seed repellent against brown-headed cowbirds (Dolbeer et al. 1998). Compounds extracted from common spices used in cooking and applied to perches in cage tests have been shown repellent characteristics against roosting European starlings (Clark 1997). Naphthalene (moth balls) was found to be ineffective in repelling European starlings (Dolbeer et al. 1988).

Tactile repellents. A number of tactile repellent products are on the market which reportedly deter birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason and Clark 1992). The repellency of tactile products is

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[4] An LD_{50} is the dosage in milligrams of material per kilogram of body weight, or, in this case in micrograms per individual bee, required to cause death in 50% of a test population of a species.

[5] An LC_{50} is the dosage in milligrams of material per liter of air required to cause death in 50% of a test population of a species through inhalation.

generally short-lived because dust tends to stick to the product. Additionally, tactile repellents may not be aesthetically pleasing and may require expensive clean-up costs as the material may run down the sides of buildings in hot weather. Commercial bird repellent products such as "4 the Birds" Transparent Bird Repellent liquid and Hot Foot Bird Repellent are registered (2003) by the VTPID for bird control use in Vermont.

Alpha-chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove pigeons, waterfowl and other birds. It is labor intensive and in some cases, may not be cost effective (Wright 1973, Feare et al. 1981). Alpha-chloralose is typically delivered as a well contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds. WS personnel are present at the site of application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment. Alpha-chloralose was eliminated from more detailed analysis in USDA (1997) based on critical element screening; therefore, environmental fate properties of this compound were not rigorously assessed. However, the solubility and mobility are believed to be moderate and environmental persistence is believed to be low. Bioaccumulation in plants and animal tissue is believed to be low. The compound is slowly metabolized, with recovery occurring a few hours after administration (Schafer 1991). The dose used for immobilization is designed to be about two to 30 times lower than the LD_{50}. Mammalian data indicate higher LD_{50} values than birds. Toxicity to aquatic organisms is unknown (Woronecki et al. 1990), but the compound is generally not soluble in water and, therefore, should remain unavailable to aquatic organisms. Factors supporting the determination of this low potential included the lack of exposure to pets, non-target species and the public, and the low toxicity of the active ingredient. Other supporting rationale for this determination included relatively low total annual use and a limited number of potential exposure pathways. The agent is currently approved for use by WS as an Investigative New Animal Drug by the FDA, rather than as a pesticide.

Egg oiling is a method for suppressing reproduction of birds by spraying a small quantity of food grade vegetable oil or mineral 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.

LETHAL, MECHANICAL METHODS

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. Normally shooting is conducted with shotguns, rifles or air rifles. Shooting is a very individual specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce nonlethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997). It is selective for target species and may be used in conjunction with the use of spotlights, decoys, and calling. Shooting with shotguns, air rifles, or rim and center fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. WS complies with all firearm safety precautions when conducting BDM activities and all laws and regulations governing the lawful use of firearms are strictly followed.

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

Cervical dislocation is sometimes used to euthanize birds which are captured in live traps or by hand. The bird is stretched and the neck is hyperextended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as a humane method of euthanasia and states that cervical dislocation, when properly executed, is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001).

Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001).

Snap traps are modified rat snap traps used to remove individual woodpeckers, European starlings, and other cavity nesting birds. The trap treadle is baited with peanut butter or other food attractants and attached near the damage area. These traps pose no imminent danger to pets or the public and are usually located in positions inaccessible to people and most non-avian animals. They are very selective because they are usually set in the defended territory of the target birds.

Hunting: WS sometimes recommends that resource owners consider legal hunting as an option for reducing bird damage. Legal hunting also reinforces harassment programs (Kadlec 1968). Nationwide, hunting is the major cause of goose mortality, but geese may seldom be available to hunters in an urban-suburban environment (Conover and Chasko 1985, Smith et al. 1999). Although legal hunting is impractical and/or prohibited in many urban-suburban areas, it can be used to reduce some populations of resident Canada geese. Zielske et al. (1993) believed legal hunting would not reduce Canada goose populations where there is limited interest in legally hunting resident Canada geese.

LETHAL, CHEMICAL METHODS

All chemicals used by WS are registered as required by the FIFRA (administered by the EPA). WS personnel who use restricted-use chemical methods are certified as pesticide applicators by VTAAFM's Plant Industry Division (VTPID) and are required to adhere to all certification requirements set forth in FIFRA and Vermont pesticide control laws and regulations. Chemicals are only used on private, public, or tribal property sites with authorization from the property owner/manager.

CO_2 is sometimes used to euthanize birds which are captured in live traps. Live birds are placed in a container such as a plastic 5-gallon bucket or other chamber, and sealed shut. CO_2 gas is released into the chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the AVMA (Beaver et al. 2001). CO_2 gas is a byproduct of animal respiration, is common in the atmosphere, and is required by plants for photosynthesis. It is used to carbonate beverages for human consumption and is also the gas released by dry ice. The use of CO_2 by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

Starlicide® (3-chloro-p-toluidine hydrochloride) a pesticide similar to DRC-1339, is not currently registered for use in Vermont, may be considered for use if it becomes registered in Vermont in the future. As part of the planning process, analysis of potential impacts of this toxicant are being addressed in this EA to determine potential impacts if and when Starlicide® becomes registered for use in VT. Starlicide® is a restricted use pesticide that is formulated as a 0.1% ready-to-use product and is commercially available to certified applicators or persons under their supervision. This avicide may be recommended or used by WS to control ravens, European starlings, crows, pigeons, cowbirds, grackles, magpies, and certain gull species. Starlicide® may be used in feedlots, around buildings and fenced non-crop areas, bird staging and roosting areas, federal and state wildlife refuges, and other sites (EPA 1995). Starlicide® is similar to DRC-1339 used in feedlots; however, it contains 0.1% DRC-1339 (USDA 1997, Appendix P). Therefore, the properties of this product are similar to DRC-1339 (discussed below).

DRC-1339 (3-chloro-p-toluidine hydrochloride) is the principal chemical method that would be used for bird damage management under the Proposed Action. DRC-1339 products are registered with the VTPID by USDA APHIS WS in Vermont. Nationwide, for more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, gull, and pigeon control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving blackbird/starling problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987), dispersing crow roosts in urban/suburban areas (Boyd and Hall 1987), and Blanton et al. (1992) reports that DRC-1339 appears to be a very effective, selective, and safe means of urban pigeon population reduction. Glahn and Wilson (1992) noted that baiting with DRC-1339 is a cost-effective method of reducing damage by blackbirds to sprouting rice.

DRC-1339 is a slow acting avicide that is registered with the EPA for reducing damage from several species of birds, including blackbirds, starlings, pigeons, crows, ravens, magpies, and gulls. DRC-1339 has several EPA Registration Labels (56228-10, 56228-17, 56228-28, 56228-29, and 56228-30) depending on the application or species involved in the bird damage management project. DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species, but only slightly toxic to non-sensitive birds, predatory birds, and mammals (Johnson et al. 1999, Schafer 1991, 1981). For example, starlings, a highly sensitive species, require a dose of only 0.3 mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens, are highly sensitive to DRC-1339. Many other bird species such as raptors (Schafer 1981), sparrows, and eagles are classified as non-sensitive. Numerous studies show that DRC- 1339 poses minimal risk of primary poisoning to non-target and T&E species (USDA 1997). Secondary poisoning has not been observed with DRC-1339 treated baits, except crows eating gut contents of pigeons (Kreps 1974). During research studies, carcasses of birds which died from DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days with no symptoms of secondary poisoning observed (Cunningham et al. 1981). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost nonexistent (Johnson et al. 1999, Schafer 1991, 1984). DRC-1339 acts in a humane manner producing a quiet and apparently painless death.

In VT, WS has registered four DRC-1339 products with the VTPID, Compound DRC-1339 98% Concentrate – Pigeons (No. 56228-28), Compound DRC-1339 98% Concentrate – nests (No. 56228-29) and Compound DRC-1339 Concentrate-Feedlots (No. 56228-10). Label instructions are followed whenever WS uses pesticide products. Treated bait is placed such that target species have access, and so access by nontarget species is eliminated or significantly reduced. In VT, WS's typical standard operating procedures used with DRC-1339 include, but are not limited to: 1. WS personnel remain on site while the pesticide is available to birds, 2. nontarget species are monitored and harassed away from the baited area whenever possible, and 3. unused bait is collected and properly stored or disposed of after conclusion of the field project.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. DRC-1339 is highly soluble in water but does not hydrolyze and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half life is about 25 hours, which means it is nearly 100% broken down within a week, and identified metabolites (i.e., degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997). Appendix P of USDA (1997) contains a thorough risk assessment of DRC-1339 and the reader is referred to that source for a more complete discussion. That assessment concluded that no adverse effects are expected from use of DRC-1339.

Appendix C. Federally Listed Threatened and Endangered Species in Vermont

Animals

Bat, Indiana	*Myotis sodalist*	Endangered
Eagle, bald (lower 48 States)	*Haliaeetus leucocephalus*	Threatened
Puma (=cougar), eastern Puma	*Felis concolor* couguar	Endangered
Tiger beetle, Puritan	*Cicindela puritana*	Threatened
Wedgemussel, dwarf	*Alasmidonta heterodon*	Endangered
Wolf, gray Eastern Distinct Population Segment	*Canis lupus*	Threatened
Lynx, Canada	*Felis Canadensis*	Threatened

Plants

Milk-vetch, Jesup's	*Astragalus robbinsii* var. *jesupi*	Endangered
Bulrush, Northeastern	*Scirpus ancistrochaetus*	Endangered

Appendix D. Correspondence from USFWS Regarding Federal T&E Species

Attached: Concurrence from the USFWS, New England Field Office, Endangered Species Specialist that implementation of the bird damage management program will not adversely affect federally-listed threatened or endangered species.

Appendix E. State Listed Threatened and Endangered Species in Vermont

Birds

Henslow's sparrow	*Ammodramus henslowii*	Endangered
Grasshopper sparrow	*Ammodramus savannarum*	Threatened
Upland sandpiper	*Bartramia longicauda*	Threatened
Black tern	*Chlidonias niger*	Threatened
Sedge wren	*Cistothorus platensis*	Endangered
Spruce grouse	*Falcipennis Canadensis*	Endangered
Peregrine falcon	*Falco peregrinus*	Endangered
Common loon	*Gavia immer*	Endangered
Bald eagle	*Haliaeetus leucocephalus*	Endangered
Loggerhead shrike	*Lanius ludovicianus*	Endangered
Osprey	*Pandion haliaetus*	Endangered
Common tern	*Sterna hirundo*	Endangered

Mammals

Eastern mountain lion	*Felis concolor couguar*	Endangered
Lynx	*Lynx Canadensis*	Endangered
Marten	*Martes Americana*	Endangered
Small-footed bat	*Myotis leibii*	Threatened
Indiana bat	*Myotis sodalist*	Endangered

Amphibians

Western chorus frog	*Pseudacris triseriata*	Endangered

Reptiles

Spiny soft-shell turtle	*Apalone spinifera*	Threatened
Spotted turtle	*Clemmys guttata*	Endangered
Timber rattlesnake	*Crotalus horridus*	Endangered
Five-lined skink	*Eumeces fasciatus*	Endangered

Fish

Lake sturgeon	*Acipenser fulvescens*	Endangered
Eastern sand darter	*Ammocrypta pellucida*	Threatened
Northern brook lamprey	*Ichtyomyzon fossor*	Endangered
American brook lamprey	*Lampetra appendix*	Threatened
Stonecat	*Noturus flavus*	Endangered
Channel darter	*Percina copelandi*	Endangered

Amphipods

Taconic cave amphipod	*Stygobromus borealis*	Endangered

Insects

Beach-dune tiger beetle	*Cicindela hirticollis*	Threatened
Cobblestone tiger beetle	*Cicindela marginipennis*	Threatened
Puritan tiger beetle	*Cicindela puritana*	Threatened

Molluscs

Dwarf wedgemussel	*Alasmidonta heterodon*	Endangered
Brook floater	*Alasmidonta varicosa*	Threatened
Cylindrical papershell	*Anodontoides ferussacianus*	Endangered
Pocketbook	*Lampsilis ovata*	Endangered
Fluted shell	*Lasmigona costata*	Endangered
Fragile papershell	*Leptodea frafilis*	Endangered
Black sandshell	*Ligumia recta*	Endangered
Eastern pearl mussel	*Margaritifera margaritifera*	Threatened
Pink heelsplitter	*Potamilus alatus*	Endangered
Giant floater	*Pyganodon grandis*	Threatened