

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

**(Pre- Decisional)
ENVIRONMENTAL ASSESSMENT**

for the

Management of Crow Damage in the Commonwealth of Virginia.

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September 2000

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ACRONYMS

ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BO	Biological Opinion
CDFG	California Department of Fish and Game
CDM	Crow damage management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DOJ	Department of Justice
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
IPM	Integrated Pest Management
IWDM	Integrated Wildlife Damage Management
MA	Methyl anthranilate
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
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
FWS	U.S. Department of Interior, Fish and Wildlife Service
VAC	Virginia Annotated Code
VDACS	Virginia Department of Agriculture and Consumer Services
OPM	Office of Pesticide Management
VA	Virginia
VDEQ	Virginia Department of Environmental Quality
VDGIF	Virginia Department of Game and Inland Fisheries
WS	Wildlife Services

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

1.0 CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.1 Introduction

The United States Department of Agriculture (USDA) is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for the Wildlife Services (WS) program is the Animal Damage Control Act of March 2, 1931, as amended (7 U.S. C. 426-426c; 46 Stat. 1468) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (P.L. 100-202). WS activities are conducted in cooperation with other federal, state and local agencies; and private organizations and individuals. Federal agencies, including the United States Department of Interior, Fish and Wildlife Service, recognize the expertise of WS to address wildlife damage issues related to migratory birds.

Wildlife damage management, or control, is defined as the alleviation of damage or other problems caused by or related to the presence of wildlife. It is an integral component of wildlife management (Leopold 1933, the Wildlife Society 1990, Berryman 1991). The WS program uses an Integrated Wildlife Damage Management (IWDM) approach (sometimes referred to as Integrated Pest Management or IPM) in which a combination of methods may be used or recommended to reduce wildlife damage. IWDM is described in Chapter 1, 1-7 of The Animal Damage Control Program Final Environmental Impact Statement (USDA 1997). These methods include the alteration of cultural practices as well as habitat and behavioral modification to prevent damage. The control of wildlife damage may also require that the offending animal(s) be removed or that populations of the offending species be reduced through lethal methods.

WS's mission is to "provide leadership in wildlife damage management in the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety." This is accomplished through:

- A) training of wildlife damage management professionals;
- B) development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
- C) collection, evaluation, and dissemination of management information;
- D) cooperative wildlife damage management programs;
- E) informing and educating the public on how to reduce wildlife damage and;
- F) providing data and a source for limited-use management materials and equipment, including pesticides (USDA 1989).

This Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts with crows in the Commonwealth of Virginia.

WS is a cooperatively funded and service oriented program. Before any operational wildlife damage management is conducted, *Agreements for Control* or *WS Work Plans* must be completed by WS and the land owner/administrator. WS cooperates with private property owners and managers and with appropriate land and wildlife management agencies, as requested, with the goal of effectively and efficiently resolving wildlife damage problems in compliance with all applicable federal, state, and local laws.

Individual actions on the types of sites encompassed by this analysis are categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). APHIS Implementing Regulations also provide that all technical assistance furnished by WS is categorically excluded (7 CFR 372.5(c)) (60 Federal Register 6,000, 6,003 (1995)). WS has decided to prepare this EA to assist in planning crow damage management (CDM) activities and to clearly communicate with the public the analysis of cumulative impacts for a number of issues of concern in relation to alternative means of meeting needs for such management in the State. This analysis covers WS's plans for current and future CDM actions wherever they might be requested within the Commonwealth of Virginia.

Biological carrying capacity is the land or habitat's limit for supporting healthy populations of wildlife without degradation to the animals' health or their environment over an extended period of time (Decker and Purdy 1988). Wildlife acceptance capacity, or cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human populations (Decker and Purdy 1988). These terms are especially important in urban areas because they define the sensitivity of a local community to a specific wildlife species. For any given damage situation, there will be varying thresholds by those directly and indirectly affected by the damage. This threshold of damage is a primary limiting factor in determining the wildlife acceptance capacity. While the Commonwealth of Virginia has a biological carrying capacity to support more than the current number of crows, the wildlife acceptance capacity is often much lower. Once the wildlife acceptance capacity is met or exceeded, people will begin to implement population or damage reduction methods, including lethal management methods, to alleviate property damage and public health or safety threats (Loker et al. 1999).

This environmental assessment (EA) documents the analysis of the potential environmental effects of the proposed program. This analysis relies mainly on existing data contained in published documents, primarily the Animal Damage Control Final Environmental Impact Statement (USDA 1997) to which this EA is tiered. These WS activities will be undertaken in compliance with relevant laws, regulations, policies, orders, and procedures including the Endangered Species Act.

A Notice of Availability of the (pre-decisional) environmental assessment was published consistent with APHIS NEPA procedures to allow interested parties the opportunity to obtain and review the document and comment on the proposed management activities.

1.2 Purpose

The purpose of this EA is to analyze the effects of WS activities in Virginia to manage damage caused by the American crow (*Corvus brachyrhynchos*) and the fish crow (*Corvus ossifragus*). American crows and fish crows are collectively called "crows" in this EA because of the difficulty of visually distinguishing the two species, especially in coastal areas where both species can be found. Also, both species have similar nesting, feeding, and roosting habits. Fish crows are more common along the coast and Chesapeake Bay (Clapp and Banks 1991). Resources protected by such activities include agricultural crops, property, human health and safety, and natural resources.

1.3 Need For Action

1.3.1 Summary of Proposed Action

The proposed action is to continue the current portion of the WS program in the Commonwealth of Virginia that responds to requests for CDM to protect agricultural crops, property, human health and safety, and natural resources in the Commonwealth of Virginia. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requestor needs for resolving conflicts with birds (Appendix B). Cooperators requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, DRC-1339, Avitrol, or euthanasia following live capture by trapping. Nonlethal methods used by WS may include habitat alteration, chemical repellents (e.g., methyl anthranilate), wire barriers and deterrents, netting, and harassment and scaring devices. In many situations, the implementation of nonlethal methods such as habitat alteration and exclusion-type barriers would be the responsibility of the requestor to implement. CDM by WS would be allowed in the State, when requested, on private property sites or public facilities where a need has been documented, upon completion of an *Agreement for Control*. All management actions would comply with appropriate federal, state, and local laws.

1.3.2 Need for Crow Damage Management to Protect Agricultural Crops

Agricultural damage by crows includes damage to field crops, especially corn, fruit and nuts, and silage. Often crows only damage a portion of each plant, such as a few kernels of a milk-stage ear of corn. However, one damaged ear per corn plant across a 60-acre field may have significant economic impacts upon the total harvestable crop. Crows cause damage to corn and soybeans by pulling up young plants to expose the germinating seed for consumption. Other damage crows cause agricultural crops are pecking fruits (e.g., tomatoes, watermelons, Asian pears, cantaloupes) which then spoil or are non-salable. Crows also eat commercially grown nuts (e.g., pecans). Additional costs associated with agricultural damage include the labor, seed, and equipment costs to replant pulled or grazed crops, implementation of wildlife management practices to discourage crows from damaging crops, decreased yields, and exposing corn ears to bacteria and mold which can sicken livestock when silage is eaten, and long distance calls to government agencies to seek assistance.

1.3.3 Need for Crow Damage Management to Protect Property

The majority of crow complaints to WS from 1992-1999 were regarding property damage (Table 1-1). However, the majority of crow complaints to VDACS from 1990 - 1998 were regarding agriculture (Table 1-1). Problems ranged from damage to residential buildings, aircraft, cars, and landscaping (lawns, gardens), to attacks on pets. Fecal droppings, particularly in urban areas, may be corrosive to automobile paint and a nuisance on sidewalks and buildings. Automobile dealerships near crow roosts can incur repetitive maintenance costs not incurred by other dealerships, thus decreasing profits. Dealerships must contract with private companies or assign employees to wash all fecal droppings from cars 1-2 times per week to make cars sellable while the crow roost is present. Also, the paint of some damaged cars may require buffing or re-painting before sale. Crows occasionally pull windshield wipers from parked cars, requiring replacement of the wiper blades. Additional costs associated with property damage include disinfectants to clean and sanitize fecal droppings, implementation of wildlife damage management methods, loss of customers or visitors irritated by walking in droppings or looking at products for sale covered in bird droppings, loss of time contacting local health departments on health or safety issues, long distance calls to state and federal wildlife management agencies to seek assistance, and worrying about pets (cats, small dogs) being harassed by crows.

Damage to buildings includes crows picking up and redistributing or removing rock ballast from flat roofed buildings. The building owner must redistribute and/or refurbish the rock ballast annually. Building owners may also incur costs of washing buildings to remove droppings that damage paint and to improve the cosmetic appearance of the building. Crows also pick latex window stripping from windows which causes double pane windows to lose their seal and fog, moisture to enter between window panes, loss of thermal insulating quality of double pane windows, and the possibility of glass panes falling out and breaking.

Crows are reported to be a nuisance by some homeowners because they get into the trash. Crows apparently learn to peck holes in plastic garbage bags and spill the bags' contents. Crows also pick through trash of lidless garbage cans and dumpsters. The result is trash littered on the property. People tire of picking up litter from trash bags torn open by crows.

1.3.4 Need for Crow Damage Management to Protect Human Health and Safety

Crows can impact human health or safety through the threat of disease and as potential hazards to aviation. Crows often form large communal roosts in winter and the buildup of fecal matter may lead to conditions favorable for the development of Histoplasma capsulatum. Histoplasma capsulatum is a fungus that grows in the upper 2 inches of soil where bird or bat droppings have accumulated for 3 or more years (Lenhart et al. 1997, Weeks 1984). When dry soil is disturbed, the spores of the fungus become airborne and may enter the lungs of the people disturbing the soil. A histoplasmosis infection would begin in the lungs (Lenhart et al. 1997).

The public often complains of the odor and noise emanating from large winter communal crow roosts which can have as many as 10,000 crows. Most communal crow roosts in Virginia are believed to be less than 1,000 birds.

While crows are infrequently struck by aircraft and comprise 2% of all known bird strikes (Cleary et al. 1998). Aircraft-crow strikes have occurred at airports in Virginia. Crows present the greatest threat to aviation when a roost is on or near the airport and crows fly through the flight path, or loaf or feed on the airfield. Additional costs associated with threats to human health or safety are incurred from contacting local health departments, smelling strong ammonia odors from the accumulation of bird droppings, labor and disinfectants to clean and sanitize fecal droppings, worry about getting histoplasmosis or other diseases from contacting droppings or inhaling fungal spores, and effort spent contacting State and federal wildlife agencies to seek assistance.

1.3.5 Need for Crow Damage Management to Protect Natural Resources

Crows cause damage to natural resources. Besides scavenging for food, crows are also predators and may feed on other birds and mammals. In Virginia, the federally threatened piping plover has been preyed on by crows. Some people are upset and others are emotionally distraught seeing young song birds or young grey squirrels picked to death by crows, or a hawk or owl endlessly chased, harassed, and picked at by crows. Some people who feed birds or enjoy watching them are upset the crows are chasing song birds, e.g., cardinals, bluebirds, robins, from their yards. Additional costs associated with natural resource damage includes implementation of wildlife damage management methods to protect threatened and endangered species, contacting state and federal agencies for assistance on reducing crow depredation on other birds and mammals, and implementing wildlife damage management programs to alleviate crow damage.

1.3.6 Case studies of crow damage

Four case studies of crow damage associated with roosts in urban areas are presented. The studies identify the damage, management attempts, and results.

Central Virginia

The first case study is the crow roost which was located in central Virginia. This roost contained from 900 to 1,225 crows from December 1997 through February 1998. The crows roosted in small white pine trees on several properties, in mature hardwoods, and atop the roof of a bank, county building, and two automobile dealership. The birds staged at an inn, restaurant, and middle school playground before going to roost after sunset. A roost has been at this location since 1992.

Damage incurred includes the expense to three car dealerships of washing cars 1-2 days per week, repainting 3 new cars, and extensive buffing of one new car during winter 1997-1998. The bank had to redistribute rock ballast and replace some rock ballast on the roof. The middle school Principal closed the playground to the children because of the accumulation of fecal droppings.

To alleviate damage, the property owners trimmed branches of the white pines to reduce thermal protection crows may have received. This had no effect on the crows. Employees at one automobile dealership threw firecrackers at crows roosting on the dealership building roof causing the crows to move to the bank and county building. One car dealership put owl effigies on its roof to repel crows and this was ineffective. This did not reduce the damage to the cars in the lot. VA Department of Agriculture and Consumer Services and county police recommended against the discharge of pyrotechnics to disperse the roost because the harassment effort would occur during evening rush hour and drivers may be distracted, resulting in a car accident.

In December 1998, WS fed the crows whole kernal corn treated with DRC-1339 to depopulate the roost and disperse the surviving crows. Also, county government officials visited local restaurants to remind them to close

the lids on trash dumpsters to deny food to the crows. The bank also said it would talk to employees to discourage them from feeding the crows. The roost contained an estimated 980 crows in mid-December and an estimated 700 crows were killed by the DRC-1339 after one application. The crow roost then moved nightly about the local area before dispersing in March 1999. The WS and VDACS surveyed the local areas and report the roost did not reform in the fall of 1999 or winter of 2000. However, there was a report of 500 crows roosting at one car dealership for one night in December 1999. This roost dispersed before WS or VDACS could verify its presence. Up to 25 crows were seen in the area of the roost in February 2000 (P. Eggborn, VDACS, pers. commun.).

Central Virginia

The second case study is a crow roost currently located in central Virginia approximately 13 miles from the above crow roost. This roost contained 2,123 crows roosting in a 3.8 acre loblolly pine stand during a January 1992 survey). The crows roost in loblolly pine trees approximately 30-35 feet tall on one property. The crows stage on a car dealership building and across the street in mature pine trees approximately 80 feet tall. The roost was established in 1985.

The damage associated with this roost is the expense of washing affected cars each week at one auto dealership and the ammonia odor emanating from the roost. The odor is due to the accumulation of excessive fecal droppings and affects the dealership and a subdivision.

To alleviate the damage, the dealership harassed the crows with pyrotechnics for 5-6 years and with a propane cannon for the last two years. The crows would startle, swirl around the area, and land back in the pines. The crows returned each year even with the harassment program. The dealership contacted the landowner with the pine stand and inquired about implementing forestry practices which would improve timber growth by thinning the pines, and dispersing the crow roost. The landowner declined the dealership's request to thin the pines. The dealership continued its harassment program in 2000.

Northern Virginia

The third case study is the crow roost currently located in northern Virginia. This roost contained approximately 300 crows roosting in a strip of 60-70 foot tall hardwood trees during a February 1998 site visit. The crows stage on a building at a car dealership. The roost was established in 1998.

The damage associated with this roost is the expense of washing cars each week at one auto dealership. The dealership has had to repaint 4 cars and buff many because of damage from the acid in the fecal droppings.

To alleviate damage, the dealership requested a county noise permit to harass crows with pyrotechnics to disperse the roost. The dealership considered cutting down the hardwood trees which are believed to be the only natural roost habitat in the area. The hardwoods are owned by the dealership, but cutting down the trees was unacceptable because of their esthetic value. The county government had concerns about effects of pyrotechnic noise on adjacent businesses and property owners and safety concerns that automobile drivers might be distracted by harassment efforts during evening rush hour, resulting in an accident. The auto dealership contacted its neighbors about its need to relocate the roost with pyrotechnics and to obtain cooperation. However, the county was unwilling to issue the noise permit for pyrotechnics because of safety concerns. The dealership then used air horns in an unsuccessful attempt to harass the crows.

Northern Virginia

The fourth case study is a crow roost currently located in northern Virginia approximately 5 ½ miles from the other northern Virginia roost. This roost contained an estimated 2,000 crows in December 1998 and over 6,000

crows in December 1999 which decreased to 4,000 crows after some management actions by Wildlife Services. This is a unique crow roost in that the crows arrive after dark whereas most crows at most roosts arrive from ½ to several hours before sunset. The crows roost in mature pine and old growth hardwood trees in and adjacent to the condominium complex. The crows stage on apartment buildings and an adjacent vacant shopping center. The roost was established in 1995.

The damage associated with this roost is the excessive accumulations of fecal droppings, repugnant odor, and noise. Residents reported excessive accumulations of fecal droppings in the parking lot and on residents cars damaged property and threatened human health. Because of the excessive droppings, many residents no longer use the parking lot. The accumulation of excessive droppings also affects pedestrian traffic in the area. The odor from the droppings is repugnant and foul to residents. The excessive noise from the cawing crows while they roost irritates the residents. The county department of health made an inspection and noted the excessive accumulations of fecal droppings from the birds. The Health Department recommended periodic cleaning of fecal droppings.

To alleviate the damage the condominium complex positioned rotating and screeching owl effigies on roof tops and used flashlights and clapped hands to flush the crows. The Virginia Department of Agriculture and Consumer Services recommended dispersing the roost with 15 mm pyrotechnics. However, county police denied the issuance of a permit to use pyrotechnics because of the disruption to the neighborhood. The county fire department was requested to use high pressure water hoses to disperse the crow roost and this request was denied. The condominium complex considered cutting down all trees from the property but rejected this option because of the aesthetic value of the trees and the shade and privacy the trees provide to the residents.

In January 1999, WS fed the crows whole kernal corn treated with DRC-1339 to depopulate the roost and disperse surviving crows. The roost contained an estimated 2,000 crows during treatment, but due to the crows arriving at staging areas around the roost after dark, bait acceptance was very poor. While some crows were killed by DRC-1339 (36 dead crows were picked up) the impact was undetectable in population counts. In December 1999, WS counted an estimated 6,000 crows at the roost. WS collected crows for blood samples to be tested by the National Wildlife Health Center for West Nile Virus at this site. Crows were shot with pellet rifles for 5 consecutive nights in December 1999 and 3 consecutive nights in January 2000. An estimated 200-250 crows were killed while attempting to collect 50 crows for blood samples. Crows were readily dispersed with pellet rifles and lights and flew about the area all night long since collections ended just prior to sunrise. Yet, with this activity and harassment the crow roost population was reduced from 6,000 to 4,000 and stabilized at an estimated 4,000 crows.

1.3.7 Summary of Types of Crow Damage

The Virginia Department of Agriculture and Consumer Services (VDACS) received over 6,000 requests for assistance with nuisance birds from January 1990 through April 1998. During that time, VDACS received 1,158 requests for assistance with crow damage, which accounted for 20% of all nuisance bird requests (Table 1-1). The WS program in Virginia received 4,697 complaints of wildlife damage from April 1992 through September 1999 of which 94 complaints (2%) were about crow damage. The need exists for effective management of damage associated with crows on agriculture, property, threats to human health or safety, and natural resources. There is a need because the difficulty the general public has in alleviating crow damage to property due to the complexity of assisting multiple property owners, involvement of local, state, and federal agencies when implementing an integrated wildlife damage management program, and restrictions of federal, state, and local statutes. Furthermore, many of the previous complexities and restrictions also apply to alleviating threats to human health or safety. WS would be expected to alleviate crow damage to natural resources, if requested, because it is a federal responsibility to protect threatened and endangered species. Crow damage management may be a management responsibility to protect species of special concern. Some crow damage management methods can best be implemented by the WS program.

1.4 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER

ENVIRONMENTAL DOCUMENTS

1.4.1 ADC Programmatic Environmental Impact Statement. WS has issued a Final Environmental Impact Statement (FEIS) on the national APHIS/WS program (USDA 1997). This EA is tiered to the FEIS. Pertinent information available in the FEIS has been incorporated by reference into this EA.

1.4.2 USDA-APHIS-WS Environmental Assessment for the Management of crow damage in the Commonwealth of Virginia. This is the EA by which WS has conducted crow damage management activities in Virginia since 1998. The new EA, "Management of crow damage in the Commonwealth of Virginia (2000)", will replace the 1998 document.

1.5 DECISION TO BE MADE

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

- Should CDM as currently implemented by the WS program be continued in Virginia?
- If not, how should WS fulfill its legislative responsibilities for managing crow damage in Virginia?
- Might the continuing of WS's current program of CDM have significant impacts requiring preparation of an EIS?

1.6 RELATIONSHIP OF AGENCIES DURING PREPARATION OF THE EA

Based on agency relationships, MOUs and legislative authorities, Virginia WS is the lead agency for this EA, and therefore responsible for the scope, contents and decisions made. The VDGIF, VDACS, and U.S. Department of Interior, Fish and Wildlife Service (FWS) contributed input throughout the EA preparation to ensure an interdisciplinary approach in compliance with NEPA, and agency authorities, policies, and regulations.

1.7 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.7.1 Actions Analyzed. This EA evaluates crow damage management by WS to protect agricultural crops, property, human health and safety, and natural resources on private land or public facilities within the State wherever such management is requested from the WS program.

1.7.2 Period for Which this EA is Valid. This EA will remain valid until WS determines that new needs for action or new alternatives having different environmental effects must be analyzed. At that time, this analysis and document will be reviewed and revised as necessary. This EA will be reviewed each year to ensure that it is complete and still appropriate to the scope of the State CDM activities.

1.7.3 Site Specificity. This EA analyzes potential impacts of WS's CDM activities that will occur or could occur at private property sites or at public facilities within the Commonwealth of Virginia. Because the proposed action is to continue the current program, and because the current program's goal and responsibility is to provide service when requested within the constraints of available funding and personnel, it is conceivable that CDM activity by WS could occur anywhere in the State. Thus, this EA analyzes the potential impacts of such efforts wherever and whenever they might occur as part of the current program. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the substantive issues that pertain to the various types of crow damage and resulting

management are the same, for the most part, wherever they occur, and are treated as such. The substantive issues analyzed in this EA were effects on crow populations, effects on nontarget species populations including T & E species, effects on human health and safety, and effects on aesthetics. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 is the routine thought process that is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS in the State (See USDA 1997, Chapter 2 and Appendix N for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigation measures and standard operating procedures described herein and adopted or established as part of the decision.

Table 1-1. Number of incidents by resource category involving crow damage reported to the USDA-APHIS-Wildlife Services Program (WS) from April 1992 through September 1999 to Virginia Department of Agriculture and Consumer Services (VDACS) from January 1990 through April 1998.

Resource Category	Resource Subcategory	Number of Requests for Assistance	
		WS	VDACS ¹
Agriculture	Field crops	16	--
	Fruit and nuts	5	--
	Other	1	783
Property	Animal	4	--
	Equipment	17	--
	Landscaping, turf and gardens	11	--
	Structures	9	--
	Other property	8	375
Human health and safety	Human health and safety	17	--
Natural resources	Threatened/endangered wildlife	2	--
	Wildlife	4	--
Total		94	1,158

1. VDACS records damage data by Resource Category only.

1.8 AUTHORITY AND COMPLIANCE

1.8.1 Authority of Federal and State Agencies in Crow Damage Management in the Commonwealth

of Virginia¹

1.8.1.1 WS Legislative Authority

The primary statutory authority for the WS program is the Animal Damage Control Act of 1931 (7 U.S.C. 426-426c; 46 Stat. 1468), which provides that:

The Secretary of Agriculture is authorized and directed to conduct such investigations, experiments, and tests as he may deem necessary in order to determine, demonstrate, and promulgate the best methods of eradication, suppression, or bringing under control on national forests and other areas of the public domain as well as on State, Territory or privately owned lands of mountain lions, wolves, coyotes, bobcats, prairie dogs, gophers, ground squirrels, jackrabbits, brown tree snakes and other animals injurious to agriculture, horticulture, forestry, animal husbandry, wild game animals, furbearing animals, and birds, and for the protection of stock and other domestic animals through the suppression of rabies and tularemia in predatory or other wild animals; and to conduct campaigns for the destruction or control of such animals. Provided that in carrying out the provisions of this Section, the Secretary of Agriculture may cooperate with States, individuals, and public and private agencies, organizations, and institutions."

Since 1931, with the changes in societal values, WS policies and 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 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 mammal and bird 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."

1.8.1.2 U.S. Department of Interior, Fish and Wildlife Service Legislative Authority (FWS)

The FWS is responsible for managing and regulating take of bird species that are listed as migratory under the Migratory Bird Treaty Act and those that are listed as threatened or endangered under the Endangered Species Act. Sections 1.8.2.2 and 1.8.2.3 below describe WS's interactions with the FWS under these two laws.

1.8.1.3 Virginia Department of Game and Inland Fisheries Legislative Authority

The Virginia Department of Game and Inland Fisheries (VDGIF), under the direction of the Governor-appointed Board of Directors, is specifically charged by the General Assembly with the management of the state's wildlife resources. Although many legal authorities of the Board and the Department are expressed throughout the Code of Virginia, the primary statutory authorities include wildlife management responsibilities (29.1-103), public education charges (29.1-109), law enforcement authorities (29.1-109), and regulatory powers (29.1-501). In 1990, the Board of Directors adopted mission statements to help

¹ See Chapter 1 of USDA (1997) for a complete discussion of federal laws pertaining to WS.

clarify and interpret the role of VDGIF in managing the wildlife resources of Virginia.

They are:

To manage Virginia's wildlife and inland fisheries to maintain optimum populations of all species to serve the needs of the Commonwealth;

To provide opportunity for all to enjoy wildlife, inland fisheries, boating and related outdoor recreation; and

To promote safety for persons and property in connection with boating, hunting, and fishing.

VDGIF currently has a Memorandum of Understanding (MOU) with WS. This document establishes a work relationship between WS and VDGIF, outlines responsibilities, and sets forth annual objectives and goals of each agency for resolving wildlife damage management conflicts in Virginia.

1.8.1.4 Virginia Department of Agriculture and Consumer Services Legislative Authority

Virginia Department of Agriculture and Consumer Services (VDACS) has the statutory authority to manage damage to agriculture and property, and to protect human health and safety from damage involving birds (Title 3.1 - 1011). VDACS currently has a MOU with WS which establishes a work relationship between WS and VDACS, outlines responsibilities, and sets forth annual objectives and goals of each agency for resolving wildlife damage management conflicts in Virginia.

1.8.2 COMPLIANCE WITH OTHER FEDERAL LAWS.

Several other federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

1.8.2.1 National Environmental Policy Act (NEPA)

WS prepares analyses of the environmental impacts of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Virginia. When WS operational 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.

1.8.2.2 Endangered Species Act (ESA)

It is federal policy, under the ESA, that all federal agencies shall seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the U.S. Fish & Wildlife Service (FWS) to use the expertise of the FWS 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 FWS in 1992 describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS initiated an informal Section 7 consultation with the FWS for the proposed crow damage management program.

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

The Migratory Bird Treaty Act (MBTA) provides the FWS 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 private entities, except as permitted by the FWS; therefore the FWS issues permits to private entities for reducing bird damage. A litigation position issued in 1997 by the U.S. Justice Department (DOJ) is that federal agencies are not subject to the MBTA procedural requirements for permits. A more recent ruling by the U.S. Court of Appeals for the District Court of Columbia (No. 99-5309) conflicts with the DOJ position, and the USDA Office of General Council has advised WS to once again apply for and obtain MBTA permits. WS will obtain MBTA permits covering CDM activities that involve the taking of species for which such permits are required in accordance with the MBTA and FWS regulations, or will operate as a named agent on MBTA permits obtained by cooperators. WS is authorized for intentional take of migratory birds for damage management purposes from the VDGIF through regulation.

WS provides phone consultations or 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 crow damage, WS provides recommendations to the FWS for the issuance of depredation permits to private entities. The ultimate responsibility for issuing such permits rests with the FWS. FWS depredation permits are not required at any time to kill crows with a shotgun when found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance (50 CFR 21.43).

1.8.2.4 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS program in Virginia are registered with and regulated by the EPA and VDACS, Office of Pesticide Management (OPM) and are used by WS in compliance with labeling procedures and requirements.

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

The National Historic Preservation Act (NHPA) of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. 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. WS activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. CDM could benefit historic properties if such properties were being damaged by birds. In those cases, the officials responsible for management of such properties would make the request and would have decision-making authority over the methods to be used. Harassment techniques that involve noise-making could conceivably disturb users of historic properties if they were used at or in close proximity to such properties; however, it would be an exceedingly rare event for noise-producing devices to be used in close proximity to such a property unless the resource being protected from crow damage was the property itself, in which case the primary effect would be beneficial. Also, the use of such devices is generally short term and could be discontinued if any conflicts with historic properties arose. WS has determined

CDM actions are not undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties. A copy of this EA is being provided to the Chickahominy, Mattaponi, and Pamunkey American Indian tribes in the State to allow them opportunity to express any concerns that might need to be addressed prior to a decision.

1.8.2.6 Environmental Justice and Executive Order 12898 - “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.”

Executive Order 12898, entitled, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” 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. It 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. 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.

1.8.3 COMPLIANCE WITH OTHER STATE LAWS.

1.8.3.1 Virginia Nuisance Bird Law

This Act allows the Commissioner of Agriculture for VDACS to conduct surveys and investigations of economic loss or public nuisances caused by birds. The Commissioner may then develop a plan of action when birds are causing economic loss or are detrimental to the health and welfare of the public, or create a public nuisance. This Act also allows the Commissioner to provide technical assistance for the suppression of nuisance birds. This Act allows the Commissioner to cooperate with federal and state agencies, other public and private agencies, organizations, institutions, and persons.

1.8.3.2 Possession, Transportation, and Release of Wildlife by Authorized Persons

This regulation (4 VAC 15-30-50) authorizes employees of federal wildlife management agencies and local animal control officers in the performance of their duties to take problem wildlife in the Commonwealth of Virginia. According to VDGIF, permits to take migratory birds are issued by the FWS and not VDGIF, therefore no state permit is required of WS to take migratory birds in Virginia.

2.0 CHAPTER 2 - ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of mitigation measures and/or standard operating procedures (SOP), and issues that will not be considered in detail, with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Additional description of affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 Issues. 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 Crow Populations
- Effects on Nontarget Wildlife Species Populations, including T&E Species
- Effects on Human Health and Safety
- Effects on Aesthetics

2.2 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

2.2.1 Effects on Crow Populations

A common concern among 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 are the American crow and the fish crow of which a minimal number of individuals are likely to be killed by WS's use of lethal control methods under the proposed action in any one year.

2.2.2 Effects on Nontarget Species populations, including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the impact of damage control methods and activities on nontarget species, particularly T & E Species. WS's SOPs

include measures intended to mitigate or reduce the effects on nontarget species populations and are presented in Chapter 3.

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 FWS under Section 7 of the Endangered Species Act (ESA) concerning potential impacts of CDM 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, Appendix F). 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. Terwilliger (1991) and Terwilliger and Tate (1995), and the U.S. Fish and Wildlife Service's list of federal T & E species for Virginia (www.fws.gov/r9endspp/.statl-r5.html) were reviewed to determine whether any T & E species might be affected by the proposed action. WS determined that CDM activities would have no effect on T & E species in Virginia from this program (letter from M. Lowney, WS, to K. Mayne, FWS, July 31, 2000).

In contrast to adverse impacts on nontarget animals from direct take by CDM methods, some nontarget species may actually benefit from CDM. Crows are predators and may feed on other birds and mammals. An example is the benefit to federally threatened piping plovers, which have been preyed on by crows in Virginia. Crows eat eggs and fledglings of song birds and young squirrels which some people enjoy viewing and feeding

2.2.3 Effects on Human Health and Safety

2.2.3.1 Safety and efficacy of chemical control methods.

Members of the public have expressed concerns that chemical CDM methods should not be used because of potential adverse effects on people from being exposed to the chemicals directly or to birds that have died as a result of the chemical use. Under the alternatives proposed in this EA, the primary toxicant proposed for use by WS is DRC-1339. DRC-1339 use is regulated by the EPA through FIFRA, by VDACS, OPM through the Virginia Pesticide Control Act, and by WS Directives. Other chemical methods that could be used are: (1) Avitrol, which is classified as an avian distressing agent and is normally used to avert certain bird species from using certain problem areas, (2) Mesurol an avian repellent used to reduce predation on eggs, and (3) methyl anthranilate an artificial grape flavoring, which has bird repellent capabilities could be used by WS. Only Avitrol and methyl anthranilate could be recommended by WS and used by the public. DRC-1339 and Mesurol can only be used by WS.

The use of Avitrol and DRC-1339 for crow damage management poses no risk to public health and safety. Mesurol poses no risk to public health and safety when used according to label instructions. WS personnel who apply pesticides are certified restricted use pesticide applicators and apply pesticides according to label instructions. Certification is obtained after passing written tests administered by the VDACS, Office of Pesticide Management.

2.2.3.2 Impacts on human safety of nonchemical CDM methods

Some people may be concerned that WS's use of firearms and pyrotechnic bird scaring devices could cause injuries to people. WS personnel occasionally use rifles and shotguns to remove crows that are causing damage. There is some potential fire hazard to private property from pyrotechnic use. There is also the potential of a safety hazard to automobile drivers that may be distracted by harassment efforts, resulting in an accident.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and 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 3 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.

2.2.3.3 Impacts on human safety of not conducting CDM to reduce disease outbreaks and bird strike hazards at airports

The concern stated here is that the absence of adequate CDM would result in adverse effects on human health and safety, because the transmission of bird-borne diseases and bird strikes on aircraft would not be curtailed or reduced to the minimum levels possible and practical. Although WS does not receive many requests to conduct CDM for disease outbreaks or reduce hazards at airports, potential impacts of not conducting such work could lead to increased incidence of bird-borne diseases in humans, or injuries or loss of human lives from bird strikes to aircraft.

2.2.4 Effects on Aesthetics

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

Some individual members or groups of wild bird species habituate and learn to live in close proximity to humans. Some people in these situations feed such birds and/or otherwise develop emotional attitudes toward such animals that result in aesthetic enjoyment. In addition, some people consider individual wild birds as “pets,” or exhibit affection toward these animals. Examples would be people who visit a city park to feed waterfowl or pigeons and homeowners who have bird feeders or bird houses. Many people do not develop emotional bonds with individual wild animals, but experience aesthetic enjoyment from observing them.

Public reaction to damage management actions is variable because individual members of the public can have widely different attitudes toward wildlife. Some individuals that are negatively affected by wildlife support removal or relocation of damaging wildlife. Other individuals affected by the same wildlife may oppose removal or relocation. Individuals unaffected by wildlife damage may be supportive, neutral, or opposed to wildlife removal depending on their individual personal views and attitudes.

The public’s ability to view wild birds in a particular area would be more limited if the birds are removed or relocated. However, immigration of birds from other areas could possibly replace the animals removed or relocated during a damage management action. In addition, the opportunity to view or feed other birds would be available if an individual makes the effort to visit other parks or areas with adequate habitat and local populations of the species of interest.

Some people do not believe that individual birds or nuisance bird roosts should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view birds and other wildlife species are lessened by WS non-lethal harassment efforts.

2.2.4.2 Effects on Aesthetic Values of Property Damaged by Birds

Property owners that have crows roosting in trees on their property or on nearby adjacent properties are generally concerned about the negative aesthetic appearance of bird droppings. Business owners generally are particularly concerned because negative aesthetics can result in lost business. Costs associated with property damage include labor and disinfectants to clean and sanitize fecal droppings, implementation of nonlethal wildlife management methods, loss of property use, loss of aesthetic value of flowers, gardens,

and lawns where crows are roosting, loss of customers or visitors irritated by the odor of or of having to walk on fecal droppings, and loss of time contacting local health departments and wildlife management agencies on health and safety issues.

2.3 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

2.3.1 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 as large as Virginia would meet the NEPA requirements for site specificity. Wildlife damage management falls within the category of federal or other agency actions in which the exact timing or location of individual activities cannot usually be predicted well enough ahead of time to accurately describe such locations or times in an EA or EIS. The WS program is analogous to other agencies or entities with damage management missions such as fire and police departments, emergency clean-up organizations, insurance companies, etc. Although WS can predict some of the possible locations or *types* of situations and sites where some kinds of wildlife damage will occur, the program cannot predict the specific locations or times at which affected resource owners will determine a bird damage problem has become intolerable to the point that they request assistance from WS. Nor would WS be able to prevent such damage in all areas where it might occur without resorting to destruction of wild animal populations over broad areas at a much more intensive level than would be desired by most people, including WS and state agencies. Such broadscale population control would also be impractical, if not impossible, to achieve.

If 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 EA's covering smaller zones.

2.3.2 Effects on Regulated Crow Hunting

Some people may be concerned that WS-conducted crow removal activities would affect regulated crow hunting by reducing local crow populations and by reducing access to huntable land. WS annual take of crows by lethal control methods is very minimal (Table 2-1) compared to the annual take of over 200,000 crows by licensed hunters within Virginia. WS activities would result in reduced crow densities on project area properties and on adjacent properties, hence slightly reducing the number of crows that may otherwise be available to local licensed hunters. Crow densities on other properties outside the project area would likely not be effected, thus providing ample opportunities for hunters to harvest crows.

Table 2-1. Number of crows taken by the Wildlife Service program of the United States Department of Agriculture, Animal and Plant Health Inspection Service in Virginia to reduce or eliminate crow damage to resources.

<u>Federal Fiscal Year</u>	<u>Number of crows taken</u>
1999	378
1998	0
1997	1
1996	0
1995	0

2.3.3 Impacts of Harassment and Removal Methods on Migratory Bird Species

Some people are concerned with the impacts of WS's non-lethal and lethal control methods on migratory bird species. WS abides by laws and regulations of the MBTA regarding the removal and harassment of migratory birds (50 CFR 21). WS minimizes potential impacts to non-target and target migratory bird species with mitigation measures/SOP's listed in Chapter 3. Non-target migratory bird species usually are not affected by WS's control methods, except for the occasional scaring effect from the sound of gunshots or scaring devices. In these cases, migratory birds may temporarily leave the immediate vicinity of shooting/scaring, but would most likely return after conclusion of the action.

2.3.4 Impacts of dispersing a bird roost on people in urban/suburban areas

Some people are concerned about dispersing a bird roost to alleviate damage or conflicts at one site can result in new damage or conflicts at the new roost site (Blum and Lenhart 1999, DWRC 1993, Glahn et al. 1991, Letter to [REDACTED] from M. Lowney, USDA, August 5, 1992). While the original complainant may see resolution to the bird problem when the roost is dispersed, the recipient of the bird roost may see the bird problem as imposed on them, thus, on the whole there is no resolution to the original bird problem (Mott and Timbrook 1984). Bird roosts usually are dispersed using a combination of harassment methods including 15 mm pyrotechnics, propane cannons, and electronic distress calls (Booth 1994). A similar continuing conflict can develop when severe habitat alteration is used to disperse a bird roost. This concern is heightened in large metropolitan areas where the likelihood of a dispersed bird roost finding a new roost location and not coming into conflict is very low (J. Glahn, NWRC, pers. commun.). WS has minimized the impact of dispersing bird roosts in urban/suburban areas by creating a management option to depopulate the crow roost creating the conflict problem.

Loudoun County had a bird (starling) roost dispersed by a developer in January 1999 using habitat alteration and the roost moved from [REDACTED] subdivision to [REDACTED] subdivision (Blum and Lenhart 1999). This roost was originally located adjacent to a subdivision located at [REDACTED] and [REDACTED]. This roost was dispersed by residents with pyrotechnics and it moved to [REDACTED]. This resulted in conflict among homeowners in three subdivision because the problem moved from one subdivision to another to another.

2.3.5 Humaneness and Animal Welfare Concerns of Lethal Methods Used by WS.

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 ...*" (Andrews et al. 1993). 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 ...*" (Andrews et al. 1993). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 1991).

Pain and suffering, as it relates to WS damage management methods, has both a professional and lay

point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since ". . . *neither medical or veterinary curricula explicitly address suffering or its relief*" (CDFG 1991).

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

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 CDM methods are used in situations where nonlethal damage management methods are not practical or effective.

VA 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, workforce and funding. Mitigation measures/SOPs used to maximize humaneness are listed in Chapter 3.

2.3.6 A site specific analysis should be made for every location where crow damage management could occur

The underlying intent for preparing an EA is to determine if a proposed action might have a significant impact. The WS EA process is issue driven, meaning issues that were raised during the interdisciplinary process and through public involvement that were substantive, were used to drive the analysis and determine the significance of the environmental impacts of the proposed action and the alternatives. Therefore, the level of site specificity must be appropriate to the issues listed. The substantive issues analyzed were effects on crow populations, effects on nontarget wildlife populations including T & E's, effects on human health, and effects on aesthetics.

The analysis in this EA was driven by the issues raised during the NEPA process. More detailed site specific information would not contribute to the public's understanding of the proposed action, nor would it change the analysis and result in substantially differing environmental consequences. Also, further site-specific analysis would provide no additional useful information to the decision-maker (Eccleston 1995).

In addition to the analysis contained in this EA, WS personnel use the WS Decision Model (Slate et al. 1992) as a site specific tool to develop the most appropriate strategy at each location. The WS Decision Model is an analytical thought process used by WS personnel for evaluating and responding to wildlife damage management requests (Fig. 3 - 1).

2.3.7 Relocation of crows causing damage

Relocation of damaging birds to other areas following live capture generally would not be effective nor cost-effective. Relocation is generally ineffective 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. Also, hundreds or thousands of crows would need to be captured and relocated to solve some damage problems, therefore relocation is unrealistic. Translocation 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 (Nielsen 1988).

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives analyzed in detail are:

- 1) Alternative 1 - Continue the Current Federal CDM Program. This is the Proposed Action as described in Chapter 1 and is the “No Action” alternative as defined by the Council on Environmental Quality for analysis of ongoing programs or activities.
- 2) Alternative 2 - Nonlethal CDM Only By WS
- 3) Alternative 3 - Technical Assistance Only. Under this alternative, WS would not conduct any direct operational CDM activities in Virginia. If requested, affected producers would be provided with technical assistance information only.
- 4) Alternative 4 - Lethal CDM Only By WS
- 5) Alternative 4 - No Federal WS CDM. This alternative consists of no federal CDM program by WS.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 - Continue the Current Federal CDM Program /Integrated Wildlife Damage Management (No Action/Proposed Action).

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

The proposed action is to continue the current portion of the WS program in the Commonwealth of Virginia that responds to requests for CDM to protect agricultural crops, property, human health and safety, and natural resources in the Commonwealth of Virginia. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of any legal technique or method, used singly or in combination, to meet requestor needs for resolving conflicts with birds (Appendix B). Cooperators requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by WS would include shooting, trapping, DRC-1339, Avitrol, or euthanasia following live capture by trapping. Nonlethal methods used by WS may include habitat alteration, chemical repellents (e.g., methyl anthranilate, Mesurol), wire barriers and deterrents, netting, and harassment and scaring devices. In many situations, the implementation of nonlethal methods such as habitat alteration and exclusion-type barriers would be the responsibility of the requestor to implement. CDM by WS would be allowed in the State, when requested, on private property sites or public facilities where a need has been documented, upon completion of an *Agreement for Control*. All management actions would comply with appropriate federal, state, and local laws.

3.1.2 Alternative 2 - Nonlethal CDM Only By WS.

Under this alternative, only nonlethal direct control activities and technical assistance would be provided by WS to resolve crow damage problems. Persons receiving technical assistance could still resort to lethal methods that were available to them. Currently, DRC-1339 is only available for use by WS employees. Therefore, use of these chemicals by private individuals would be illegal. Appendix B describes a number of nonlethal methods available for use by WS under this alternative.

3.1.3 Alternative 3 - Technical Assistance Only.

This alternative would not allow for WS operational CDM in Virginia. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct CDM using traps, shooting, Avitrol, or any nonlethal method that is legal. Avitrol could only be used by State certified pesticide applicators. Currently, DRC-1339 is only available for use by WS employees. Therefore, use of this chemical by private individuals would be illegal. Appendix B describes a number of methods that could be employed by private individuals or other agencies after receiving technical assistance advice under this alternative.

3.1.4 Alternative 4 - Lethal CDM Only By WS.

Under this alternative, only lethal direct control services and technical assistance would be provided by WS. Technical assistance would include making recommendations to the FWS and regarding the issuance of permits to resource owners to allow them to take crows by lethal methods. Requests for information regarding nonlethal management approaches would be referred to VDGIF, VDACS, FWS, local animal control agencies, or private businesses or organizations. Individuals or agencies might choose to implement WS lethal recommendations, implement nonlethal methods or other methods not recommended by WS, contract for WS direct control services, use contractual services of private businesses, use volunteer services of private organizations, or take no action. In some cases, control methods employed by others could be contrary to the intended use or in excess of what is necessary. Not all of the methods listed in Appendix B as potentially available to WS would be legally available to all other agencies or individuals.

3.1.5 Alternative 5 - No Federal WS CDM.

This alternative would eliminate Federal involvement in CDM in Virginia. WS would not provide direct operational or technical assistance and requesters of WS services would have to conduct their own CDM without WS input. DRC-1339 is only available for use by WS employees. Therefore, use of this chemical by private individuals would be illegal. Avitrol could be used by State certified restricted-use pesticide applicators.

3.2 CDM STRATEGIES AND METHODOLOGIES AVAILABLE TO WS IN VIRGINIA

The strategies and methodologies described below include those that could be used or recommended under Alternatives 1, 2, 3 and 4 described above. Alternative 5 would terminate both WS technical assistance and operational CDM 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 a cost-effective² manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM may incorporate cultural practices (i.e., animal husbandry), habitat modification (i.e., exclusion), animal behavior modification (i.e., scaring), removal of individual offending animals, local population reduction, or any combination of these, depending on the circumstances of the specific damage problem.

3.2.2 Alternative 1 - The IWDM Strategies That WS Employs Under the Current CDM Program (No Action/Proposed Action).

3.2.2.1 Technical Assistance Recommendations.

“Technical assistance” as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. 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 non-WS entities to use. Technical assistance may be provided following 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.

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.

3.2.2.2 Direct Damage Management Assistance.

This is the conduct or supervision of damage management activities by WS personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through

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

technical assistance alone, and when *Agreements for Control* or other comparable instruments provide for WS direct damage management. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted use pesticides are necessary, or if the problem is complex.

WS's direct damage management assistance activities in resolving crow damage have been mostly lethal because resource owners are able to resolve most crow damage themselves. WS is asked to provide assistance to these same resource owners after their non-lethal or lethal methods fail to reduce damage to acceptable levels. However, at airports WS implements lethal and non-lethal assistance to reduce threats to aviation.

3.2.2.3 Education efforts in Virginia.

Education is an important element of WS's program activities because wildlife damage management is about finding "balance" or co-existence 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 and demonstrations are provided to farmers, homeowners, 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, laws and regulations, and agency policies.

WS provides informational leaflets about crow damage management and biology and ecology, and about specific methods (e.g., sources of pyrotechnics). In federal fiscal years 1994 - 1999, the WS program in Virginia provided 134 leaflets to the public about crows, damage management, and methods.

3.2.3 WS Decision Making.

WS personnel use a thought process for evaluating and responding to damage complaints that is depicted by the WS Decision Model described by Slate et al. (1992) (Figure 3-1). WS personnel are frequently contacted after requesters have tried or considered nonlethal methods and found them to be impractical, too costly, or inadequate for reducing damage to an acceptable level. WS personnel assess the problem, evaluate the appropriateness and availability (legal and administrative) of strategies and methods based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation are developed into a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for 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 documented process, but a mental problem-solving process common to most if not all professions.

3.2.4 Community Based Decision Making

3.2.4.1 Technical assistance provided by Wildlife Services to resource owners for decision making

The WS program in Virginia follows the “Co-managerial approach” to solve wildlife damage or conflicts as described by Decker and Chase (1997). Within this management model, WS provides technical assistance regarding the biology and ecology of crows and effective, practical, and reasonable methods available to the local decision maker(s) to reduce wildlife damage. This includes nonlethal and lethal methods. Technical assistance on alleviating damage caused by crows is available from VDACS and VDGIF also. WS and other state and federal wildlife or wildlife damage management agencies may facilitate discussions at local community meetings when resources are available. Resource owners and others directly affected by crow damage or conflicts in Virginia have direct input into the resolution of such problems. They may implement management recommendations provided by WS or others, or may request management assistance from WS, other wildlife management agencies, local animal control agencies, or private businesses or organizations.

Local decision makers decide which effective methods should be used to solve a wildlife-people conflict. These decision makers include community leaders, private property owners/managers, and public property owners/managers.

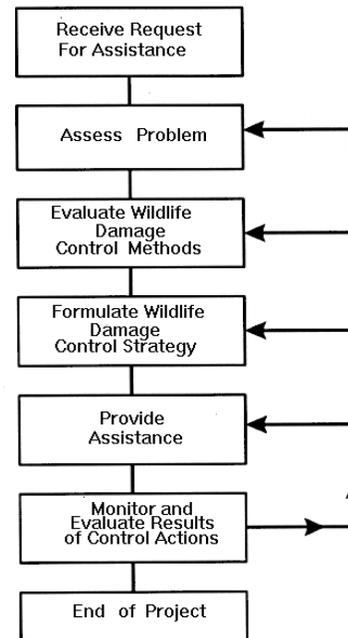
3.2.4.2 Criteria to depopulate a crow roost

WS will consult with VDACS, VDGIF, and FWS when a request is received or WS recommends to depopulate a winter communal crow roost. Winter communal roosts generally form from late October through mid March in Virginia. WS will make a site visit to verify the damage, record nonlethal methods which had been implemented, evaluate other reasonable and practical nonlethal methods which may be implemented, evaluate the impacts identified in this EA, and to discuss methods with resource owners to alleviate crow damage. Finally, WS will approve or deny the resource owner’s request to depopulate the roost.

The following scenarios were considered for approving or denying a request to depopulate a crow roost:

1. In rural or agricultural areas crow roosts would not be depopulated because other population management methods (i.e. hunting, Avitrol) and nonlethal harassment methods are available.
2. At civil airports and military air bases where crow flight lines into roosts or large congregations of loafing or feeding crows from roosts threaten aviation safety, crow roosts may be depopulated.
3. In urban/suburban areas where the dispersal of a crow roost is likely to result in the

Figure 3-1. APHIS, WS Decision Model



establishment of a new crow roost in another urban/suburban area, or when local government officials prohibit the use of pyrotechnics, distress calls, and propane cannons to disperse the crow roost because of safety concerns, then the crow roost may be depopulated.

3.2.4.2.1 Justification for depopulating a crow roost

Depopulating a communal crow roost reduces the number of birds and thus reduces damage. Also, the surviving crows disperse from the historic crow roost (Boyd and Hall 1987) which reduces damage in the local area. The wildlife acceptance capacity for crows would be expected to increase after the local crow population is reduced (Decker and Purdy 1988).

3.2.5 Crow Damage Management Methods Available for Use by WS. (See Appendix B for detailed descriptions of CDM Methodologies)

3.2.5.1 Nonchemical, Nonlethal Methods (See Appendix B for detailed descriptions)

Agricultural producer and property owner practices consist primarily of nonlethal preventive methods such as cultural methods³ and habitat modification.

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

- 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 scaring tactics

Habitat/environmental modification to attract or repel bird species.

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

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle.

3.2.5.2 Chemical, Nonlethal Methods (See Appendix B for detailed descriptions)

Methyl Anthranilate (MA) (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. Research is being conducted to potentially register MA as a crow repellent for landfill operations (Timm 1994).

Mesuroil has been shown to teach crows to avoid consuming similarly looking untreated eggs after an extended time period of aversive conditioning (Dimmick and Nicolaus 1990, Avery and Decker 1994). Mesuroil was registered in 2000 to protect threatened and endangered bird eggs preyed upon by crows.

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

3.2.5.3 Mechanical, Lethal Methods (See Appendix B for detailed descriptions)

Shooting is the practice of selectively removing target birds by shooting with an air rifle, shotgun, or rifle. Shooting a few individuals from a larger flock can reinforce birds' fear of harassment techniques. Shooting with rifles or shotguns is used to manage crow 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 CDM strategy to enhance the effectiveness of harassment techniques or to reduce local or area-wide crow populations. Although WS does not use sport hunting, it recommends, where appropriate, sport hunting to alleviate crow damage.

Live traps are traps designed to capture birds alive for euthanasia. Traps that are available for CDM include the padded jaw leghold trap and Australian Crow Trap (Johnson and Glahn 1994). Birds captured in traps may be euthanized by cervical dislocation or carbon dioxide.

Cervical dislocation is an American Veterinary Medical Association (AVMA) approved euthanasia method which is sometimes used to euthanize birds which are captured in live traps (Andrews et al. 1993) when relocation is not a feasible option.

Carbon dioxide (CO₂) gas is an AVMA approved euthanasia method which is sometimes used to euthanize birds which are captured in live traps (Andrews et al. 1993) when relocation is not a feasible option. Live birds are placed in a container or chamber into which CO₂ gas is released. The birds quickly expire after inhaling the gas.

3.2.5.4 Chemical, Lethal Methods (See Appendix B for detailed descriptions)

Avitrol is a chemical frightening agent registered for use on pigeons, crows, gulls, blackbirds, starlings, and English sparrows in various situations. This chemical works by causing distress behavior in the birds that consume treated kernels from a mixture of treated and untreated bait, which generally frightens the other birds from the site. Generally birds that eat the treated bait will die (Johnson and Glahn 1994).

DRC-1339 is a slow acting avicide for reducing damage from several species of birds, including crows. DRC-1339 is highly toxic to sensitive species but only slightly toxic to nonsensitive birds, predatory birds and mammals. This chemical would be the primary lethal chemical method used for CDM under the current program.

3.2.6 Alternative 2 - Nonlethal CDM Only By WS

This alternative would require that WS only utilize nonlethal methods (3.2.5.1 and 3.2.5.2) in addressing crow damage problems, including nonlethal technical assistance recommendations. WS has been unable to implement non-lethal crow roost dispersal projects because of local ordinances about use of pyrotechnics or noise making devices and concern by local police that pyrotechnics will distract automobile drivers and result in an accident. Producers, state agency personnel, or others could conduct CDM activities including the use of traps, shooting, and any lethal or nonlethal methods they deem effective. However, DRC-1339 is currently only available for use by WS employees. Therefore use of this chemical by private individuals would be illegal and private and commercial applicators would be left only with using other alternatives such as Avitrol if chemical control was needed.

3.2.7 Alternative 3 - Technical Assistance Only

This alternative would not allow WS operational CDM in the State. WS would only provide technical assistance and make recommendations when requested. Producers, state agency personnel, or others could conduct CDM activities including the use of traps, shooting, and any lethal or nonlethal methods they deem effective. However, DRC-1339 is currently only available for use by WS employees. Therefore use of this chemical by private individuals would be illegal and private and commercial applicators would be left only with using other alternatives such as Avitrol if chemical control was needed.

3.2.8 Alternative 4 - Lethal CDM Only By WS

This alternative would require that WS only utilize lethal control methods (3.2.5.3 and 3.2.5.4) in addressing crow damage problems, including lethal technical assistance recommendations. WS would provide recommendations to the FWS regarding the issuance of permits to resource owners to allow them to take crows by lethal methods. Producers, state agency personnel, or others could conduct CDM activities including the use of traps, shooting, and any lethal or nonlethal methods they deem effective. DRC-1339 would be available for use by WS employees. Private and commercial applicators would be left with the alternative of using a chemical repellent such as Avitrol.

3.2.9 Alternative 5 - No Federal WS CDM

This alternative would consist of no federal involvement in CDM in the State, neither direct operational management assistance nor technical assistance to provide information on nonlethal and/or lethal management techniques would be available from WS. Producers, state agency personnel, or others would be left with the option to conduct CDM activities including the use of traps, shooting, and any lethal or nonlethal methods they deem effective with the exception of DRC-1339 which is currently only available for use by WS employees. Therefore use of this chemical by private individuals would be illegal and private and commercial applicators would be left only with using other alternatives such as Avitrol if chemical control was needed.

3.3 Mitigation and Standard Operating Procedures for Crow Damage Management Techniques

3.3.1 Mitigation in Standard Operating Procedures (SOPs)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide and in Virginia, uses many such mitigation measures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1997). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS's Standard Operating Procedures include:

- The WS Decision Model thought process which is used to identify effective wildlife damage management strategies and their impacts.
- Reasonable and prudent measures or alternatives are identified through consultation with the FWS and are implemented to avoid impacts 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 impacts to the environment when chemicals are used in accordance with label directions.

- All WS Specialists in the State who use restricted chemicals are certified restricted-use pesticide applicators by VDACS and trained by program personnel or others who are experts in the safe and effective use of chemical CDM materials.
- The presence of nontarget species is monitored before using DRC-1339 to control crows, to reduce the risk of significant mortality of nontarget species populations.
- Research is being conducted to improve CDM methods and strategies so as to increase selectivity for target species, to develop effective nonlethal control methods, and to evaluate nontarget hazards and environmental impacts.
- Preference is given to nonlethal methods, when practical and effective. If practical and effective nonlethal control methods are not available and if lethal control methods are available and appropriate for WS to implement, WS may implement lethal methods.

Some additional mitigating factors specific to the current program include:

- 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 uses CDM 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 hazard to the public is even further reduced.

3.3.2 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.

3.3.2.1 Effects on Target Species Populations

- CDM activities are directed to resolving bird damage problems by taking action against individual problem birds, or local populations or groups, not by attempting to eradicate populations in the entire area or region.

3.3.2.2 Effects on Nontarget Species Populations Including T&E Species

- WS personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding nontargets.
- Observations of birds are made to determine if nontarget or T & E species would be at significant risk from CDM activities.
- WS has consulted with the FWS regarding potential impacts 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 FEIS, Appendix F (USDA 1997). Further consultation on species not covered by or included in that formal consultation process has been initiated with the FWS and WS will abide by any RPAs, RPMs, and terms and conditions that result from that

process to avoid jeopardizing any listed species.

- WS uses chemical methods for CDM that have undergone rigorous research to prove their safety and lack of serious effects on nontarget animals and the environment.
- WS would retrieve all dead birds to the extent possible, following treatment with Avitrol.
- Avitrol will not be applied on Assateague Island due to concern about Delmarva fox squirrels.
- Avitrol will not be used when bald eagles are present at a site, within ½ mile of nest sites or around shoreline areas where eagles loaf, and WS will check computer databases operated by VDGIF to identify shoreline areas and nest sites used by bald eagles.
- Even though DRC-1339 offers no secondary poisoning risk to bald eagles, dead crows will be retrieved to the extent possible.

3.3.2.3 Humaneness of lethal bird control methods

- Padded jaw leghold traps would be used if leghold traps were used to capture crows. This method would rarely be used and has not been used by WS to date.

3.3.2.4 Effects on aesthetics

- Treated bait would be applied as discretely as possible.
- Dead birds would be picked up in early in the morning to lessen the likelihood of people seeing the dead birds.

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. The 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 proposed action to determine if the real or potential impacts would be greater, lesser, or the same. Therefore, the proposed action or current program alternative serves as the baseline for the analysis and the comparison of expected impacts among the alternatives. The background and baseline information presented in the analysis of the current program alternative thus also applies to the analysis of each of the other alternatives.

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, floodplains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber, and range. These resources will not be analyzed further.

Cumulative Impacts: Discussed in relationship to each of the potentially affected species analyzed in this chapter.

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

Impacts on sites or resources protected under the National Historic Preservation Act: WS CDM actions are not undertakings that could adversely affect historic resources (See Section 1.8.2.5).

4.1 Environmental Consequences for Issues Analyzed in Detail

4.1.1 Effects on Crow Populations

4.1.1.1 Alternative 1. - Continue the Current Federal Crow Damage Management Program (The No Action/Proposed Action as described in Chapter 1)

Analysis of this issue is limited to crows killed during WS CDM. 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 only after they have caused damage.

Ecology of crows

Two species of crow are present in Virginia: the American crow (*Corvus brachyrhynchos*) and the fish crow (*Corvus ossifragus*). American crows are found throughout the State while fish crows are found mostly in coastal areas (Clapp and Banks 1991). Due to the similarity in appearance, food habits, nesting, and roosting behavior, we will use "crow" to refer to both American and fish crows.

In Virginia, crows begin nesting in mid-March (Clapp and Banks 1991) and crow pairs remain together throughout the year (Johnson 1994). Nests are built 20-50 feet high in pines, cedars and other trees (Kalmbach 1939, Clapp and Banks 1991) or on radio towers. Nests are constructed of twigs, sticks, and coarse stems and are lined with feathers, shredded bark, grass, cloth and string (Johnson 1994). Crows have 1 or 2 clutches per year of 4-5 eggs (Kalmbach 1939, Clapp and Banks 1991). Eggs hatch in about 18 days and young begin to fledge in 30 days (Johnson 1994). The life expectancy for a crow in the wild is 4-6 years, however, crows have been known to live up to 14 years in the wild and 20 years in captivity (Johnson 1994).

In fall and winter, crows form large flocks. The flocks roost together at night and disperse to different feeding areas during the day. Crows will fly up to 6-12 miles from the roost to a feeding site each day (Johnson 1994). During the spring and summer, crows forage most intensively close to the nest with a maximum home range size of 1,000 meters² (0.621 miles²) (Sullivan and Dinsmore 1990). After dispersing from the roost, crows begin foraging around sunrise each day (Knopf and Knopf 1983, Stouffer and Caccamise 1991). By late morning, the crows decrease foraging activity, and by mid-afternoon crows start forming larger groups (Knopf and Knopf 1983, Stouffer and Caccamise 1991). The larger groups, which forage in late afternoon, return to the roost at sunset.

Crow densities in Virginia

VDGIF provided hunter harvest data, but was unable to provide any definitive estimates of population sizes for purposes of the following analyses on impacts to the population. Therefore, WS used the best available information to produce reasonable estimates.

Crow populations in Virginia are considered increasing based on trends in breeding bird surveys according to the United States Geological Survey, Patuxent Wildlife Research Center (Sauer et al. 1999)(Figure 4-1 and 4-2). VDGIF, the state authority responsible for monitoring and managing crows in Virginia believes crows are increasing and are an under-utilized resource by legal hunters (B. Ellis, VDGIF, pers. commun.). Breeding bird survey data indicates American crows have been increasing 1.2% annually from 1966 to 1998 (Sauer et al. 1999). Also, the breeding bird survey reported Virginia had the highest relative abundance of American crows among all 50 states (Sauer et al. 1999). Fish crows have been increasing 7.5% annually from 1966 through 1998 in Virginia according to the breeding bird survey (Sauer et al. 1999).

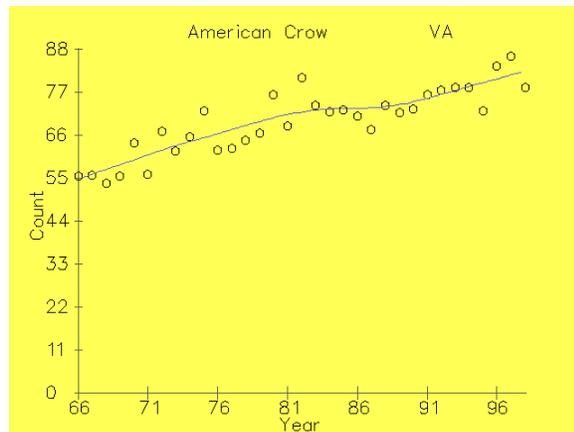


Figure 4-1 in Virginia from

1. Population trend of American crows the breeding bird survey.

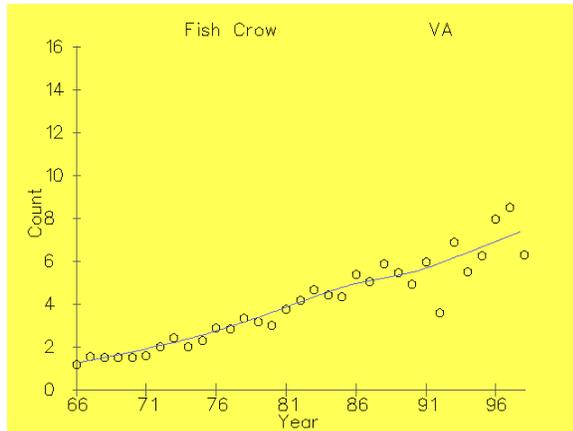


Figure 4-2. Population trend of fish crows in Virginia, from the breeding bird survey.

Crow population impact analysis

Crows are a popular game bird legally hunted in Virginia (Table 4-1). They are also a pest species killed by farmers because crows damage crops. They may also be killed by other citizens because of the damage or nuisance crows cause to property, threats to human health, or natural resources. The number of crows killed by farmers and other citizens is unknown and not measured by any survey.

Table 4-1. The estimated number of crows legally killed by hunters during regulated hunting seasons in Virginia. The Virginia Department of Game and Inland Fisheries measures hunter harvest through surveys (Wright et al. 1999, Wright and Emerald 1998, 1997, Wright and McFarland 1996, and Wright 1995).

<u>Year</u>	<u>Hunter harvest</u>
1993 - 1994	201,549
1994 - 1995	321,133
1995 - 1996	291,277
1996 - 1997	203,961
1997 - 1998	285,513
1998 - 1999	258,422

WS lethally removed an estimated 700 crows as part of their CDM program in FY1999, which is only 0.0025% of the crows taken by hunters in 1997 - 1998. An unknown number of crows are taken annually under the authority of the FWS standing depredation order for crows (50 CFR 21.43). No state permits are required to kill crows causing damage when crows are killed according to the depredation order for crows.

Since WS has no authority or control over sport or other harvest or mortality of crows in the State, the *status quo* for crow populations and human-caused crow mortality in Virginia is almost the same with or without the involvement of the federal program. This is further suggested by the likelihood that some of the crows killed by WS would be killed anyway since they were depredating animals. There is also the strong possibility that even more crows would be killed in the absence of WS involvement since landowners or other private entities would tend to be less selective for depredating crows than experienced WS personnel and might therefore kill more non-offending crows in attempts to stop depredation problems.

WS has not impacted crow populations in Virginia and expects that its crow take would be minor compared to sport and other depredation take allowed by the VDGIF and the FWS. The VDGIF, as the agency with management responsibility for wildlife in Virginia, could impose restrictions on sport harvest and depredation order harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on crow population are within those desired by the State and would thus have no significant adverse impact on the quality of the human environment.

WS take is monitored by comparing numbers of birds killed with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse impacts to the viability of native species populations (USDA 1997, Chapter 4, Fig. 4 - 1; Fig. 4-3).

Magnitude is defined as a measure of the number of animals killed in relation to their abundance. In this analysis, magnitude is evaluated first in terms of total harvest or population trend, then in terms of WS program kill. Magnitude is determined either quantitatively or qualitatively. The quantitative method is more rigorous and used when allowable harvest, state population level, and harvest data is available. Qualitative methods are based on state population trends and harvest data or regional population trends and population modeling. This EA used the qualitative method because only state population trend data (Figure 4-1, 4-2) and harvest data (Table 4-1) was available.

The use of population trends as an index of magnitude is based on the assumption that annual harvests do not exceed allowable harvest levels. State wildlife management agencies act to avoid over-harvests by restricting hunting and trapping to ensure that annual harvests are within allowable harvest levels. The criteria for judging total harvest magnitude on the basis of animal population trends are as follows:

- if the population is increasing, the magnitude is low.
- if the population is stable, the magnitude is moderate.
- if the population is decreasing, the magnitude is high.

The WS kill magnitude is based on the fraction of total harvest attributed to the WS program . Magnitude ratings for the WS program are based on the following criteria:

- if WS kill is less than or equal to 33 percent of the total harvest, the magnitude is considered low.
- if WS kill is greater than 33 percent but less than or equal to 66 percent of the total harvest, the magnitude is considered moderate if the total harvest rating is high, or low if the total harvest rating is moderate.
- if WS kill is greater than 66 percent of the total harvest, the magnitude is considered equivalent to the total harvest rating.

WS uses population trend analysis as an index of the magnitude of the harvest. Populations trend analysis indicates American and Fish crow populations are increasing (Fig. 4-1, 4-2), thus the magnitude is low. The WS magnitude is based on the fraction of total harvest attributed to the WS program. The mean number of crows harvested by hunters from 1993 - 1999 was 260,309 birds (Table 4-1). If WS killed 30,000 crows this would represent 10.3 percent of the total harvest and would be considered low magnitude.

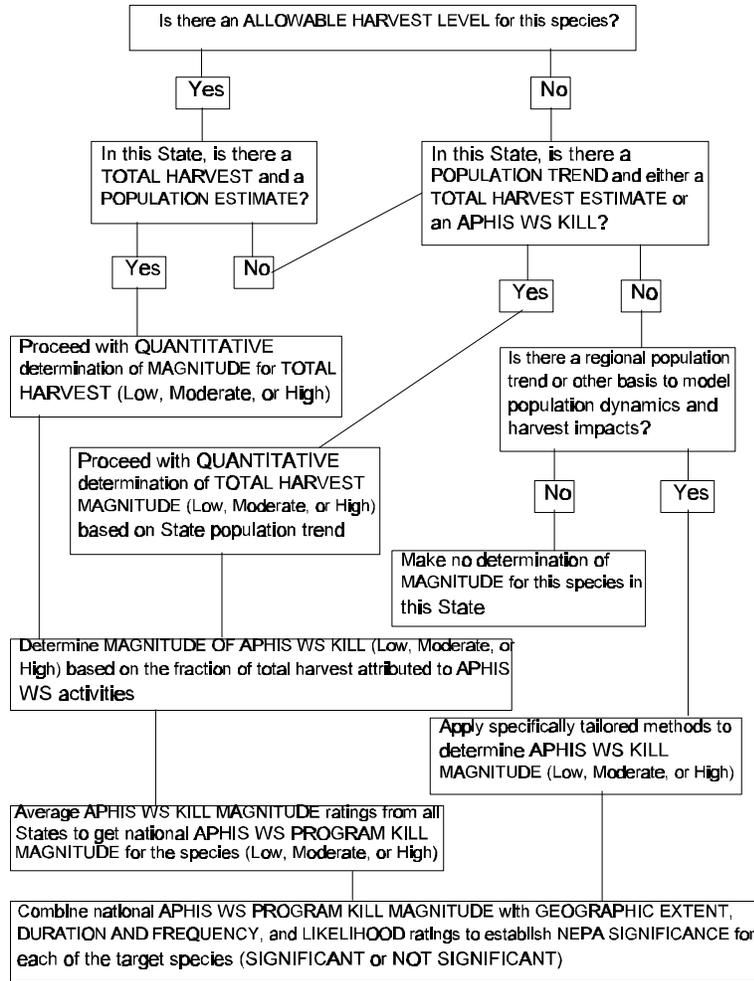


Figure 3-2. Procedures for evaluating WS program impacts on abundance of a target species.

The WS program reported it killed an estimated 700 crows at one roost in central Virginia in FY 1999 (*see* Section 1.3.6, first case study). The difference between the verified kill and estimated kill is because DRC-1339 was used to kill most of the crows and not all dead crows were found. Only dead crows which were found are counted in the Management Information System (MIS) as part of the verified kill. The MIS does not record estimated kill at this time.

WS uses the estimated crows killed with DRC-1339 to analyze the magnitude of the impact on the crow population. The estimated number of crows killed is determined by counting the crow population to be treated the day of or before treatment. The crow population is then counted each day post-treatment to

determine the reduction in crow numbers. The estimated number of crows killed would be expected to always be larger than the number of dead crows picked up.

4.1.1.2 Alternative 2 - Nonlethal CDM Only by WS

Under this alternative, WS would not take any crows because no lethal methods would be used and only nonlethal technical assistance recommendations would be made. Although WS take of target bird species would not occur, it is likely that, without WS conducting some level of lethal CDM activities, private CDM efforts would increase, leading to potentially similar or even greater cumulative impacts on target species populations than those of the current program alternative. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that target bird populations would be impacted significantly by implementation of this alternative. DRC-1339 is currently only available for use by WS employees and would not be available under this Alternative. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be greater than the proposed action, about the same as Alternative 3, but less than under Alternative 5.

4.1.1.3 Alternative 3 - Technical Assistance Only

Under this alternative, WS would have no impact on crow populations in the State because the program would not conduct any operational CDM activities but would be limited to providing advice only. Private efforts to reduce or prevent crow damage and perceived disease transmission risks could increase which could result in similar or even greater impacts on those populations than the current program alternative. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that target bird populations would be impacted significantly by implementation of this alternative. DRC-1339 is currently only available for use by WS employees and would not be available under this Alternative. It is possible that frustration caused by the inability to reduce losses could lead to illegal use of other chemicals which could lead to real but unknown impacts on target bird populations. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 2.

4.1.1.4 Alternative 4 - Lethal CDM Only by WS

Under this alternative, WS would likely have a greater impact on the crow population in the State than Alternative 1 (No Action/Proposed Action). Only lethal CDM activities would be implemented to resolve crow damage in all situations. WS would not recommended or use any nonlethal CDM activities to reduce crow damage within Virginia. It is likely that a greater number of crows would have to be removed lethally to attempt to achieve the same results as the proposed action. For the same reasons shown in the population impacts analysis in section 4.1.1.1, however, it is unlikely that target bird populations would be impacted significantly by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce losses to acceptable levels could lead to illegal use of other chemicals which could lead to real but unknown impacts on target bird populations. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 2.

4.1.1.5 Alternative 5 - No Federal WS CDM

Under this alternative, WS would have no impact on target species populations in the State. Private efforts to reduce or prevent depredations could increase which could result in impacts on target species populations to an unknown degree. Impacts 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 impacts analysis in section 4.1.1.1 it is unlikely

that target bird populations would be impacted significantly by implementation of this alternative. DRC-1339 is currently only available for use by WS employees and would not be available under this Alternative. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of other chemicals which could lead to real but unknown impacts on target bird populations.

4.1.2 Effects on Nontarget Species Populations, including Threatened and Endangered Species.

4.1.2.1 Alternative 1 - Continue the Current Federal Bird Damage Management Program (The No Action/Proposed Action)

Adverse Impacts on Nontarget (non-T&E) Species. WS take of non-target species during CDM activities has been none. Although it is possible that some non-target birds were 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 usually applied immediately where crows are observed loafing (i.e. staging) or feeding and unconsumed bait is picked up after the crows feed (Boyd and Hall 1987). A much less common approach to using DRC-1339 for crows is, after a period of pre-baiting with untreated bait and when non-target birds are not observed coming to feed at the site, then DRC-1339 treated bait may be placed on roof tops or elevated areas where crows loaf and non-target birds are unlikely to be found. The treated bait may be left on the roof top for up to one week before being picked up. While every precaution is taken to safeguard against taking non-target birds, at times 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. The non-target bird species which are most likely to be found feeding on roof tops and affected by DRC-1339 applications for crows are European starlings and rock doves (pigeons). Adverse impacts from secondary poisoning from DRC-1339 are negligible (Johnson et al. 1999).

Beneficial Impacts on Nontarget Species, including T&E Species.

As stated in Chapter 1, Wildlife Services would be expected to alleviate predatory crow damage to protect T&E species because it is a federal responsibility to protect T&E species or a management responsibility to protect species of special concern. WS would implement CDM activities as requested by VDGIF, FWS, or another organization to protect T&E species throughout the State. In FY 1998 and 1999 WS responded to 2 requests to protect piping plovers, a federal threatened species being preyed upon by fish and American crows.

T&E Species Impacts. WS CDM expects no adverse impacts on any of the listed birds, mammals, invertebrates, fish, reptiles, amphibians, or plants. Mitigation measures are in place to ensure no impact on T & E species.

The 1992 Biological Opinion (B.O.) from the FWS concluded that the northern flying squirrel, Delmarva fox squirrel, piping plover, and roseate tern would not be adversely affected by any aspect of the WS program which included all methods of CDM described herein (USDA 1997, Appendix F).

The 1992 Biological Opinion (B.O.) from the FWS determined that the only CDM 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 CDM in the State. DRC-1339 poses no primary hazard to eagles because eagles do not eat grain or other bait materials on which this chemical might be applied during CDM, 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 and Avitrol are low to nonexistent (Johnson et al. 1999)(see Appendix

B). Therefore, WS CDM in Virginia will have no adverse effects on bald eagles.

Mitigation measures to avoid T&E impacts were described in Chapter 3 (section 3.4.2.2). The inherent safety features of DRC-1339 use that preclude or minimize hazards to mammals and plants are described in Appendix B and in a formal risk assessment in the ADC FEIS (USDA 1997, Appendix P). Those measures and characteristics should assure there would be no jeopardy to T&E species or adverse impacts on mammalian or non-T&E bird scavengers from the proposed action. None of the other control methods described in the proposed action alternative pose any hazard to nontarget or T&E species.

4.1.2.2 Alternative 2 - Nonlethal CDM Only by WS

Adverse impacts on nontarget (non-T & E) Species. Under this alternative, WS take of nontarget animals would probably be the same as the proposed action because no lethal control actions would be taken by WS. However, nontarget take would not differ substantially from the current program because the current program takes no nontarget animals. On the other hand, parties whose crow damage problems were not effectively resolved by nonlethal control methods and recommendations would likely resort to other means of lethal control such as use of shooting by private persons or even illegal use of chemical toxicants. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of nontarget birds. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget species populations, including 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 Impacts to Non-target Species, including T & E Species. There would likely be no beneficial impacts to T & E Species under this alternative. Where nonlethal methods are ineffective or impractical because of an increasing crow population and the persistence crows display when exploiting a food resource, then T & E species are likely to incur greater egg, nestling, and fledgling mortality. Non-target species which preferred by some people would suffer likewise. The cost of implementing a nonlethal program to protect non-target species and T & E species would be much greater than an integrated program.

4.1.2.3 Alternative 3 - Technical Assistance Only

Adverse impacts on nontarget (non-T & E) Species. Alternative 3 would not allow any WS direct operational CDM in the area. There would be no impact on nontarget or T&E species 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 lethal control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of nontarget wildlife than under the proposed action. It is hypothetically possible that, similar to but probably less than under Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget 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. Impacts under this alternative would therefore likely be greater than the proposed action, but slightly less than Alternative 2 and 4.

Beneficial Impacts to Non-target Species, including T & E Species. There would be some beneficial impacts because WS would provide technical information informing people about all reasonable and

practical methods to reduce crow predation on non-target species and T & E Species. However, the benefits may not be as great as the preferred alternative due to less experience and knowledge some people have at reducing crow predation. Also, WS employees have access to more methods, such as DRC-1339 and Mesurool, which would make WS more effective and efficient at alleviating crow predation on other wildlife.

4.1.2.4 Alternative 4 - Lethal CDM Only by WS

Adverse impacts on nontarget (non-T & E) Species. Under this alternative, only lethal CDM activities would be recommended and implemented to resolve crow damage in all situations. WS would not recommend or use any nonlethal CDM activities to reduce crow damage within Virginia. WS take of nontargets would not differ substantially from the current program described in section 4.1.2.1. Although technical support, similar to Alternative 3, might lead to more selective use of lethal control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of nontarget wildlife than under the proposed action. It is hypothetically possible that, similar to but probably less than under Alternative 2, frustration caused by the inability to reduce losses to acceptable levels could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget 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 Impacts to Non-target Species, including T & E Species. The impacts would about the same as the proposed action (4.1.2.1).

4.1.2.5 Alternative 5 - No Federal WS CDM

Adverse impacts on nontarget (non-T & E) Species. Alternative 5 would not allow any WS CDM in the State. There would be no impact on nontarget or T&E species by WS CDM 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 nontarget wildlife than under the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of nontarget birds. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could impact local nontarget 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 Impacts to Non-target Species, including T & E Species. The impacts would about the same as the nonlethal CDM Only by WS alternative (4.1.2.2). T & E species and non-target wildlife would probably be harmed by this alternative.

4.1.3 Effects on Human Health and Safety

4.1.3.1 Impacts of chemical CDM methods on human health by Alternative

Alternative 1 - Continue the Current Program (No Action/Proposed Action)

DRC-1339 (3-chloro-p-toluidine hydrochloride). DRC-1339 is the primary lethal chemical CDM method that would be used under the current program alternative. There has been some concern expressed by a few members of the public that unknown but significant risks to human health may exist from DRC-1339

used for CDM.

The Virginia WS program used 35 grams of DRC-1339 for CDM activities in FY1999. A total of 422 grams of DRC-1339 was used by WS in Virginia in FY1999. Therefore, actual use of this chemical by WS in the State has been extremely low. 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 this chemical and its use in CDM. Factors that virtually eliminate any risk of public health problems from use of this chemical are:

- its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions expressed by a few members of the public, DRC-1339 is not applied to feed materials that livestock can feed upon).
- 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). Regardless, however, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.
- WS personnel are Virginia certified restricted-use pesticide applicators.

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 CDM. Appendix B provides more detailed information on this chemical.

Avitrol is available as a prepared grain bait mixture that is mixed in with clean bait at no greater than a 1:9 treated to untreated mixture. The technical grade chemical is not currently handled by Virginia WS personnel. There has been no use of Avitrol in the Virginia program — over the 7-year period of FY 1994-2000. Appendix B provides more detailed information on this chemical and its use in CDM. In addition to this factor, other 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. Regardless, however, the extremely controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public to this chemical.
- Treated crows usually die in 10 - 20 minutes. Dead crows would be picked soon after dying.

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

Other CDM Chemicals. Other nonlethal CDM chemicals that might be used or recommended by WS if they become registered for CDM would include repellents such as methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent for other bird species and is currently being researched as a bird repellent additive for use in landfill operations (Timm 1994). Appendix B provides more detailed information on this chemical and its current use in bird damage management. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or 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 impacts on the environment (USDA 1997).

Alternative 2 - Nonlethal CDM Only by WS

Alternative 2 would not allow for any lethal methods to be used or recommended by WS. WS could only implement and recommend nonlethal methods such as harassment and exclusion devices and materials. Nonlethal methods could, however, include chemical repellents such as methyl anthranilate, if and when it becomes a registered repellent for crows, which, although already considered safe for human consumption because it is artificial grape flavoring, might nonetheless raise concerns about human health risks. Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before they would be registered by EPA or FDA. Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and state pesticide laws and regulations and FDA rules 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. Excessive cost or ineffectiveness of nonlethal techniques could result in some entities

rejecting WS's assistance and resorting to other means of CDM. DRC-1339 is 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 current program alternative.

Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS's assistance. However, use of Avitrol in accordance with label requirements should avoid 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 crow 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 and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any direct operational CDM assistance by WS in the State. WS would only provide advice and, in some cases, equipment or materials (i.e., by loan or sale) to other persons who would then conduct their own damage management actions. Concerns about human health risks from WS's use of chemical CDM methods would be alleviated because no such use would occur. DRC-1339 is only registered for use by WS personnel and would not be available for use by private individuals except certified applicators under the direct supervision of WS personnel. 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 Alternative 1 (No Action/Proposed Action). However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical CDM methods use should be less than under Alternative 5. Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS's assistance. Use of Avitrol in accordance with label requirements should avoid 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 and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

Alternative 4 - Lethal CDM Only by WS

Under this alternative, only lethal CDM activities would be implemented to resolve crow damage in all situations. WS would not recommended or use any nonlethal CDM activities to reduce crow damage within Virginia. WS's use of chemical CDM methods would not differ substantially from the current program described in section 4.1.3.1. Although technical support, similar to Alternative 3, might lead to more selective use of lethal control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to a greater human health risk than under the proposed action. 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, similar to but probably less than under Alternative 2, frustration caused by the inability to reduce losses to acceptable levels could lead to illegal use of chemical toxicants that could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

Alternative 5 - No Federal WS CDM

Alternative 5 would not allow any WS CDM in the State. Concerns about human health risks from WS's use of

chemical CDM methods would be alleviated because no such use would occur. DRC-1339 is 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 current program alternative. Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS's assistance. However, use of Avitrol in accordance with label requirements should avoid 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 crow 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 and to mammalian and avian scavengers. Some chemicals that could be used illegally would 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 nonchemical CDM methods by Alternative

Alternative 1 - Continue the Current Program (No Action/Proposed Action)

Nonchemical CDM methods that might raise safety concerns include shooting with firearms 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 VA WS program has had no accidents involving the use of firearms or pyrotechnics in which a member of the public or WS 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 significant impacts on human safety from WS's use of these methods is expected. Technical advice could be provided to private individuals in the safe and proper use of CDM control devices. This would likely reduce human safety risks somewhat when WS's advice is utilized, but some private CDM activities will continue without WS's technical advice resulting in an increase risk to human safety, although not to the point that they would be significant.

Alternative 2 - Nonlethal CDM Only by WS

Under this alternative, WS would not use firearms for lethal control during CDM but would still be able to use them as a harassment method. Pyrotechnics would also be used by WS. Risks to human safety from WS's use of firearms and pyrotechnics would be similar to those described under Alternative 1. Technical advice would be provided to private individuals in the safe and proper use of nonlethal control devices. However, increased use of firearms, both as a lethal and a nonlethal CDM device, by less experienced and trained private individuals, would probably occur due to the sometimes ineffectiveness of nonlethal methods when they are used alone. This would likely increase human safety risks somewhat, although not to the point that they would be significant.

Alternative 3 - Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any nonchemical CDM method. Risks to human safety from WS's use of firearms and pyrotechnics would be lower than the current program alternative, but not significantly because VA WS's current CDM program has an excellent safety record in which no accidents involving the use of these devices have occurred that have resulted in a member of the public or WS being harmed. Technical advice would be provided to private individuals in the safe and proper use of CDM control devices. However, increased use of firearms, both as a lethal and a nonlethal CDM device, and pyrotechnics by less experienced and trained private individuals would probably occur without WS direct operational assistance, which would likely increase human safety risks somewhat. Impacts to human safety would be similar to Alternative 2 but to a lesser extent than Alternative 5, because some of these private parties would be receiving advice and instruction from WS. However, it is unlikely that these increased risks would be significant.

Alternative 4 - Lethal CDM Only by WS

Under this alternative, only lethal CDM activities would be implemented to resolve crow damage in all situations. WS would not recommended or use any nonlethal CDM activities to reduce crow damage within Virginia. WS's use of nonchemical lethal CDM methods , the use of firearms, would not differ substantially from the current program described in Alternative 1. Although technical support, similar to Alternative 3, might lead to more selective use of lethal control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods. Resulting in risks to human safety similar to Alternative 2, but to a lesser extent than Alternative 5 because some of these private parties would be receiving advice and instruction from WS, however, it is unlikely that these increased risks would become significant.

Alternative 5 - No Federal WS CDM

Under this alternative, WS would not engage in or recommend use of any CDM methods. Risks to human safety from WS's use of firearms and pyrotechnics would be alleviated because no such use would occur. However, increased use of firearms and pyrotechnics by less experienced and trained private individuals would probably occur without WS assistance. WS would not provide assistance to private individuals in the safe and proper use of CDM control devices. Risks to human safety would probably increase under this alternative, although not to the point that they would be significant.

4.1.3.3 Impacts on human safety of not conducting CDM to reduce disease outbreaks and bird strike hazards at airports by Alternative

Alternative 1 - Continue the Current Program (No Action/Proposed Action)

As discussed in Chapter 1, crows can present a bird aircraft strike hazard at airports and cause diseases that are transmittable to humans and that can adversely affect human health. In many 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 CDM service may consider this risk to be unacceptable and may request such service primarily for that reason. CDM, either by lethal or nonlethal means, would, if successful, reduce the risk of bird aircraft strikes and bird-borne disease transmission at the site for which CDM is requested. This alternative has the greatest possibility of successfully reducing impacts to human health and safety since all CDM methods could possibly be implemented and recommended by WS. An example would be in a situation such as those involving urban crow populations, the implementation of nonlethal controls such as exclusionary devices and harassment methods could actually increase the risk of human health and safety 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 and safety concerns in the local area. By having the option of using lethal control methods where nonlethal methods would likely not be successful, the risks to human health and safety are reduced not only at the crow damage site but also in the surrounding area.

Alternative 2 - Nonlethal CDM Only by WS

Under this alternative, WS would be restricted to implementing and recommending only nonlethal methods in providing assistance with crow damage problems. Impacts would likely be greater under this alternative than the proposed action. Entities requesting CDM assistance for human health and safety concerns would only be provided information on nonlethal barriers or exclusion devices, habitat alteration, or other nonlethal methods such as harassment. Because some of these nonlethal methods would likely only be effective at the individual sites where they are used, this alternative would likely create or increase human health and safety risks at other locations to where the birds would then move. 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. Because DRC-1339 would not be available for use by non-WS personnel, it may be difficult to achieve local population reduction. In such cases, human health and safety risks may remain the same or become worse. Also, under this alternative, human health and safety problems would probably increase if private individuals were unwilling to implement nonlethal control methods because of high cost or lack of faith in their effectiveness, or if they were unable to hire other entities to conduct effective CDM for human health and safety concerns.

Alternative 3 - Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any CDM method. Only technical advice would be recommended to alleviate crow damage in all situations. Individuals requesting CDM for human health and safety concerns would either (1) not take any action which means the risk of human health and safety problems would continue or would increase in each situation, (2) implement WS recommendations for nonlethal CDM methods site-by-site, which would most probably result in crows relocating to other locations possibly creating or increasing human health and safety risks at new sites, (3) undertake lethal CDM methods themselves, or (4) hire animal control agents to conduct CDM activities. Because DRC-1339 would not be available for use by non-WS personnel, it may be difficult to achieve local population reduction. Under this alternative, human health problems could increase if private individuals were unable to achieve effective CDM with technical assistance alone, or if they were unable to hire other entities to conduct effective CDM for human health and safety concerns. Overall impacts to human safety would likely be greater than the proposed action.

Alternative 4 - Lethal CDM Only by WS

Under this alternative, only lethal CDM activities would be implemented or recommended to resolve crow damage in all situations. DRC-1339 would be available for use, but all lethal CDM methods would not be available in all situations, such as when local ordinances restrict the discharge of firearms. In these situations WS would not be able to recommend or use nonlethal methods that otherwise would be available under the proposed action. If private individuals did not implement their own nonlethal program in this particular situation, the likely results would be crow damage remaining the same or increasing. Overall impacts on human safety would likely be greater under this alternative than the proposed action.

Alternative 5 - No Federal WS CDM

With no WS assistance, private individuals and community government officials would be responsible for developing and implementing their own CDM program. Impacts on human safety would likely be greater under this alternative than the proposed action, because these parties would either (1) not take any action which means the risk of human health and safety problems would continue or would increase in each situation, (2) implement nonlethal control methods site-by-site, which would most probably result in crows relocating to other locations possibly creating or increasing human health and safety risks at new sites, (3) undertake lethal control methods, or (4) hire animal control agents to conduct CDM activities. A primary difference between this alternative and the proposed action is that DRC-1339 would not be available. Under this alternative, human health problems could increase if private individuals were unable to find and implement effective means of controlling crows to an acceptable level.

4.1.4 Effects on Aesthetics

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

Alternative 1 - Continue the Current Program (No Action/Proposed Action)

Some people who routinely view or feed individual birds such as crows would likely be disturbed by removal of such birds under the current program. WS is aware of such concerns and has taken it into consideration in some cases to mitigate them.

Some people have expressed opposition to the killing of any crows during CDM activities. Under the current program, some lethal control of birds would continue and these persons would continue to 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.

Some people do not believe that crows or crow roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing crows would feel their interests are harmed by WS's nonlethal harassment program. Mitigating that impact, however, is the fact that overall numbers of crows in the area are not diminished by a harassment program and people who like to view these species can still do so on State wildlife management areas, state parks, national forests, national wildlife refuges, county parks as well as numerous private property sites where the owners are not experiencing damage to the birds and are tolerant of their presence.

Alternative 2 - Nonlethal CDM Only by WS

Under this alternative, WS would not conduct any lethal CDM but would still conduct harassment of crows that were causing damage. Some people who oppose lethal control of wildlife by government but are tolerant of government involvement in nonlethal wildlife damage management would favor this alternative.

Some people do not believe that crows or crow roosts should even be harassed to stop or reduce damage problems. Some people who enjoy viewing crows would feel their interests are harmed by WS's nonlethal harassment program. Mitigating that impact, however, is the fact that overall numbers of crows in the area are not diminished by a harassment program and people who like to view these species can still do so on State wildlife management areas, National wildlife refuges, as well as numerous private property sites where the owners are not experiencing damage to the birds and are tolerant of their presence.

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 similar CDM activities as those that would no longer be conducted by WS which means the impacts would then be similar to the current program alternative.

Alternative 3 - Technical Assistance Only

Under this alternative, WS would not conduct any direct operational CDM but would still provide technical assistance or self-help advice to persons requesting assistance with crow damage. Some people 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 similar CDM activities as those that would no longer be conducted by WS which means the impacts would then be similar to the current program alternative.

Alternative 4 - Lethal CDM Only by WS

Under this alternative, only lethal CDM activities would be implemented or recommended. People that have expressed opposition to the killing of any crows during CDM activities would likely be opposed to this alternative.

However, private entities would likely conduct similar CDM activities as those that would be conducted by WS and also those that are no longer conducted by WS, which means the impacts would then be similar to the current program alternative.

Alternative 5 - No Federal WS CDM

Under this alternative, WS would not conduct any lethal or nonlethal CDM activities. Some people who oppose 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 similar CDM activities as those that would no longer be conducted by WS, resulting in impacts that would be similar to the current program alternative.

4.1.4.2 Effects on Aesthetic Values of Property Damaged by Birds

Alternative 1 - Continue the Current Program (No Action/Proposed Action)

Under this alternative, WS would provide operational and technical assistance in reducing crow problems in which droppings from crows are causing an unsightly mess and would, if successful, improve aesthetic values of affected properties in the view of property owners and managers. All CDM methods would be available for use, including the use of DRC-1339. Dispersal of nuisance roosting crows 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 dispersing such birds, coordination with local authorities to monitor the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 2 - Nonlethal CDM Only by WS

Under this alternative, WS would only provide nonlethal operational and technical assistance in reducing crow problems in which droppings from crows are causing a unsightly mess and would, if successful, improve aesthetic values of affected properties in the view of property owners and managers. Dispersal of nuisance roosting crows 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 dispersing such birds, coordination with local authorities to monitor the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations. If nonlethal CDM methods are not effective in reducing crow problems WS would not be able to recommend or implement any potential successful lethal CDM method. Private individuals would then have the option of doing nothing, which would not reduce the problem, or implement their own control methods, which can have varying success. Overall, impacts of improving aesthetics would be slightly less than the proposed action.

Alternative 3 - Technical Assistance Only

Under this alternative, the lack of operational assistance in reducing nuisance crow problems would mean aesthetic values of some affected properties would continue to be adversely affected resulting in less of a possibility of improving aesthetic values. The success of improving aesthetic values would be greater than under Alternative 5, this is because some of these property owners would be able to resolve their problems by following WS's technical assistance recommendations. Dispersal of nuisance crows or crow 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. In such cases, limiting WS to technical assistance only could result in a greater chance of adverse impacts on aesthetics of property owners at other locations than the current program alternative.

Alternative 4 - Lethal CDM Only by WS

Under this alternative, only lethal CDM activities would be implemented or recommended. This alternative would result in nuisance crows being removed by lethal means only. Where lethal CDM could be conducted crow damage would likely be reduced to acceptable levels. In areas where lethal CDM could not be conducted, such as areas with local ordinances restricting the discharge of firearms, crow damage would not be reduced. Property owners would be required to develop and implement their own nonlethal CDM programs. Dispersal of nuisance crows or crow roosts through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. If WS does not provided nonlethal 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. Thus, this alternative would most likely result in more property owners experiencing adverse effects on the aesthetic values of their properties than the current program alternative.

Alternative 5 - No Federal WS CDM

Under this alternative, the lack of any operational or technical assistance in reducing nuisance crow problems in which droppings from the birds cause unsightly mess would mean aesthetic values of some affected properties would continue to be adversely affected if the property owners were not able to achieve CDM some other way. In many cases, this type of aesthetic “damage” would worsen because property owners would not be able to resolve their problems and bird numbers would continue to increase resulting in a greater chance of adverse impacts on aesthetics of property owners than the current program alternative.

Table 4-2 summarizes the expected impacts of each of the alternatives on each of the issues.

4.2 Cumulative Impacts

No significant cumulative environmental impacts are expected from any of the 5 alternatives. Under the Proposed Action and Alternative 4, the lethal removal of crows would not have a significant impact on overall crow populations in Virginia, but some local reductions may occur. This is supported by the VDGIF, which is the agency with responsibility for managing crows in the State. No risk to public safety is expected when WS’ services are provided and accepted by requesting individuals in Alternatives 1,2,3, and 4, since only trained and experienced wildlife biologists would conduct and recommend CDM activities. There is a slight increased risk to public safety when CDM activities are conducted by persons that reject WS assistance and recommendations in Alternatives 1, 2, 3, and 4, and when no WS assistance is provided in Alternative 5. In all 5 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS’ participation in CDM activities to protect agricultural crops, property, human health and safety, and natural resources from crow damage, the analysis in this EA indicates that WS Integrated CDM program will not result in significant cumulative adverse impacts on the quality of the human environment.

Table 4-2. Relative Comparison of Anticipated Impacts From Alternatives.

Issues/Impacts	Alt. 1 Current Program (Proposed Action / No Action)	Alt. 2 Nonlethal Only	Alt. 3 Technical Assistance (TA) Only	Alt. 4 Lethal Only	Alt. 5 No Federal Program
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Target Species Impacts	Low impact - reduction in local crow numbers would not significantly affect species population	Low impact - reductions in local crow numbers would not occur or would also be insignificant.	Low impact - reductions in local crow numbers may occur but would also be insignificant to populations	Low impact - reductions in local crow numbers would occur but would also be insignificant to populations	Low impact - reductions in local crow numbers less likely w/o WS assistance, but would be insignificant to populations if they occurred.
Impacts to Non-target Species	Low impact - methods used by WS would be highly selective with very little risk to nontarget species	Low impact but greater than Alt. 1 - people with crow problems may resort to less selective lethal methods, if they reject nonlethal methods.	Low impact but greater than Alt. 1, but less than Alt. 2 - people with crow problems may resort to less selective lethal methods, but less likely with WS TA.	Low impact but greater than Alt. 1 - people with crow problems may resort to less selective methods, if they reject recommended lethal methods, but less likely than Alt. 2	Low impact but greater than Alts. 1, 2, 3, or 4 - people with crow problems may resort to less selective lethal methods w/o WS assistance.
Human Health and Safety - Risks of Adverse Effects from CDM Methods	Low risk - methods used by WS would be safe with no probable risk of human health or safety effects.	Low risk but slightly greater than Alt.1 - people with crow problems may resort to illegal lethal chemicals or methods that pose human/safety risks if they reject nonlethal methods.	Low risk but slightly greater than Alt.1, slightly less than Alt. 2 - people with crow problems may resort to illegal lethal or chemical methods that pose human health/safety risks; less likely with WS TA.	Low risk but slightly greater than Alt. 1, slightly less than Alt. 2 - people with crow problems may resort to illegal lethal chemicals or methods that pose human/safety risks if they reject recommended lethal methods.	Low risk but greater than Alts. 1, 2, 3, or 4 - people with crow problems may resort to illegal chemical or other methods that pose human/safety risks; most likely w/o WS direct or TA assistance.
Human Health and Safety - Risks of Adverse Effects from Crow Damage	Low risk -crow damage problems most likely to be resolved without creating or moving problems elsewhere.	Low to Moderate risk but greater than Alt. 1 - risks would increase where nonlethal methods would not resolve crow problems.	Higher risk than Alt. 1, but less than Alt 2 - individuals may be able to resolve crow problems with TA assistance, but harassment programs would not be coordinated by WS resulting in a greater chance of crows relocating to new damage sites.	Higher risk than Alt. 1, but similar to Alt. 3 - if unable to resolve crow problems with lethal methods, individuals would have to implement their own nonlethal harassment program without coordination of the program by WS.	Higher risk than Alts. 1, 2, 3, or 4 - persons with crow problems might be able to achieve success, but less likely w/o WS direct operational or technical assistance
Aesthetic Enjoyment of Birds	Low to Moderate impact (at local level only) - WS CDM does not adversely affect overall bird species populations but there may be local reductions.	Low impact- crow numbers at damage sites would remain high or would increase, unless nonlethal recommendations were rejected and crow numbers were reduced by non-WS personnel	Low to Moderate impact (at local level) - crow numbers at damage sites would remain high or would increase, unless TA recommendations are implemented successfully.	Low to Moderate impact (at local level only) - WS CDM does not adversely affect overall bird species populations but there may be local reductions.	Low impact - crow numbers at damage sites would remain high or would increase, unless persons are successful in reducing crow numbers w/o WS direct operational or technical assistance.
Aesthetic Damage by Crows	Low impact -crow damage problems most likely to be resolved without creating or moving problems elsewhere.	Low to Moderate impact but greater than Alt. 1 - impacts would increase where nonlethal methods would not resolve crow problems.	Higher impact than Alt. 1, but less than Alt 2 - individuals may be able to resolve crow problems with TA assistance, but harassment programs would not be coordinated by WS resulting in a greater chance of crows relocating to new damage sites.	Higher impact than Alt. 1, but similar to Alt. 3 - if unable to resolve crow problems with lethal methods, individuals would have to implement their own nonlethal harassment program without coordination of the program by WS.	Higher impact than Alts. 1, 2, 3, or 4 - persons with crow problems might be able to achieve success, but less likely w/o WS direct or TA assistance

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APPENDIX A

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APPENDIX B

CROW DAMAGE MANAGEMENT (CDM) METHODS AVAILABLE FOR USE OR RECOMMENDATION BY THE VIRGINIA WILDLIFE SERVICES PROGRAM

NONLETHAL METHODS - NONCHEMICAL

Agricultural producer and property owner practices. These consist primarily of nonlethal 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 judgement on their effectiveness and practicality. These methods include:

Cultural methods. These may include altering planting dates so that crops are not young and more vulnerable to damage when the damage-causing species is 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 care or 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 CDM. 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 CDM strategies at or near airports to reduce bird aircraft strike problems 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 crows 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.

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 but not all methods that are included by this category are:

- Bird-proof barriers
- Electronic guards
- Propane exploders
- Pyrotechnics
- Distress Calls and sound producing devices
- Chemical frightening agents
- Repellents
- Scare crows
- Mylar tape
- 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, particularly because of the aerial mobility of birds which requires overhead barriers as well as peripheral fencing or netting. Exclusion adequate to stop bird movements can also restrict movements of livestock, people and other wildlife (Fuller-Perrine and Tobin 1993).

Overhead wire grids can deter crow use of specific areas where they are causing a nuisance (Johnson 1994). The birds apparently fear colliding with the wires and thus avoid flying into areas where the method has been employed.

Netting can be used to exclude crows 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 crows from feeding, loafing, staging, or roosting at that site. A few people would find exclusionary devices such as netting unsightly, trashy, and a lowering of the aesthetic value of the neighborhood when used over personal gardens.

Auditory scaring devices such as propane exploders, pyrotechnics, electronic guards, scare crows, 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, they 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 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, effigies (scarecrows), sometimes are 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.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction is generally only applied when dealing with a single bird or very few birds. This method is used to discourage birds from constructing nests in areas which may create nuisances 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 highly mobile and can easily return to damage sites from long distances, or because of high populations. This method poses no imminent danger to pets or the public.

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.

NONLETHAL METHODS - CHEMICAL

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, if ,and when it becomes registered for use on crows. Methyl anthranilate (MA) (artificial grape flavoring food additive) has been shown to be a promising repellent for many bird species, including

waterfowl (Dolbeer et al. 1993). Cummings et al. (1995) found effectiveness of MA declined significantly after 7 days. Belant (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; 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/bee⁴), nontoxic to rats in an inhalation study ($LC_{50} > 2.8$ mg/L⁵), 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 U.S. Food and Drug Administration (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 retreating required every 3-4 weeks (RJ Advantage, Inc. 1997). 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 nonirritating 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 lb./ 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.

Mesuroil was recently registered by WS to repel crows and ravens from birds nests of T & E species. It could be used by WS only as a bird repellent to deter predation by crows on eggs of threatened or endangered species. Dimmick and Nicolaus (1990) showed breeding pairs of crows could be conditioned with aversive chemicals to avoid eggs. However, Avery and Decker (1994) observed increased consumption of eggs treated with higher doses of Mesuroil by fish crows. Sullivan and Dinsmore (1990) reported bird nests greater than 700 meters from crow nests were relatively safe from crow predation, thus nests beyond 700 meters from active crow nests may not need to be treated.

WS would treat eggs similar in appearance as those eggs of the species needing protection. The active ingredient is injected into eggs which are placed in artificial nests or upon elevated platforms. Upon ingestion, birds develop post-ingestional malaise (Mason 1989) and crows develop an aversion to consuming similar looking eggs (Dimmick and Nicolaus 1990). Repeated exposures may be necessary to develop and maintain aversion to threatened or endangered species eggs as the learning curve for crows can take from 23 days to 3 months (Dimmick and Nicolaus 1990, Avery and Decker 1994).

Treated areas will be posted with warning signs at access points to exclude people from endangered or threatened species nesting areas. Treated eggs are not placed in locations where threatened or endangered species may eat the treated eggs. Mesuroil is highly toxic to birds and mammals and toxic to fish. It is also highly toxic to honey bees.

LETHAL METHODS - MECHANICAL

⁴An 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.

⁵An 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.

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large number 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. All firearm safety precautions are followed by WS when conducting CDM activities and all laws and regulations governing the lawful use of firearms are strictly complied with.

Firearm use is very sensitive and a public concern because of safety issues relating to the public and 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 3 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.

Live traps include:

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.

Leghold traps are used by WS for preventative and corrective damage management. Trapping with leghold traps can be effective in areas where a small resident crow population is present (Johnson 1994). No. 0 or 1 leghold traps with padded jaws would be used to trap individual birds in areas habitually used by crows. Traps would be monitored a minimum of twice each day and trapped birds euthanized by methods approved by the AVMA or a veterinarian.

Sport hunting is sometimes recommended by WS as a viable damage management method when the target species can be legally hunted. A valid hunting license and other licenses or permits may be required by the VDGIF and USFWS for certain species. This method provides sport and food for hunters and requires no cost to the landowner. Sport hunting is occasionally recommended if it can be conducted safely for crow damage management around crops or other resources.

Cervical dislocation is sometimes used to euthanize birds which are captured in live traps. 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 humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds (Andrews et al. 1993). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Andrews et al. 1993).

LETHAL METHODS - CHEMICAL

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

CO₂ 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 chamber and sealed shut. CO₂ gas is released into the bucket or chamber and birds quickly die after inhaling the gas. This method is approved as a euthanizing agent by the AVMA (Andrews et al. 1993). CO₂ 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 CO₂ by WS for euthanasia purposes is exceedingly minor and inconsequential to the amounts used for other purposes by society.

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 nonlethal 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 English sparrows in various situations. Avitrol treated bait is placed in an area where the targeted birds are feeding and usually a few birds will consume a 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. It can be used during 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 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, is nonaccumulative in tissues and 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 (LD₅₀) 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 GI 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 nontarget indicator species tested on this compound (USDA 1997, Appendix P).

DRC-1339 is the principal chemical method that would be used for crow damage management in the proposed action. 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 crows 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 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 nonsensitive 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 nonsensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to nontarget 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.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet 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 (1994) 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.

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. Virginia WS used or supervised the use of an average of 365 grams (0.8 pounds) of DRC-1339 per year for the past 3 years (Table B-1).

Table B-1. DRC-1339 Used by Virginia WS.

FY	EPA Reg.	Species	Quantity Used (grams)
1999	56228-10	Blackbirds/ Starlings	165
	56228-28	Pigeons	221
	56228-30	Blackbirds, crows	36
1998	56228-10	Blackbirds/ Starlings	15
	56228-28	Pigeons	251
	56228-30	Blackbirds, crows	0
1997	56228-10	Blackbirds/ Starlings	2
	56228-28	Pigeons	405
	56228-30	Blackbirds, crows	0

APPENDIX A
Additional Information
to the
Environmental Assessment for the

MANAGEMENT OF CROW DAMAGE IN THE COMMONWEALTH OF VIRGINIA

The Wildlife Services program in Virginia has been informed of two additional non-lethal methods that may be available to alleviate crow damage. We are including these two techniques in this decision document because they may be used by Wildlife Services to reduce crow damage. The techniques are the use of lasers to disperse roosting crows and Rejex-It as a fog to disperse crows. Each method will be described.

Lasers are non-chemical, non-lethal, and an experimental technique recently evaluated by the National Wildlife Research Center to disperse double-crested cormorant roosts (Glahn et al. 2000). The lasers must be used after sunset and before sunrise to be effective at dispersing cormorants. Moving the laser light through the tree branches rather than touching birds with the laser light elicited an avoidance response from cormorants (Glahn et al. 2000). During pen trials with lasers the cormorants were inconsistent in their response with some birds showing no response to the laser (Glahn et al. 2000). The lack of overt response by cormorants to lasers is not clearly understood, but suggests laser light is not an highly aversive agent (Glahn et al. 2000). Blackwell et al. (in review) tested lasers on several bird species and observed varied results among species. Lasers were ineffective at dispersing starlings and cowbirds (Blackwell et al. (in review)). Lasers were initially effective at dispersing pigeons and mallard ducks but the birds habituated in approximately 5-minutes and 20-minutes, respectively (Blackwell et al. (in review)). Canada geese reacted to the laser displaying neophobic avoidance to the approaching laser beam. The use of lasers to disperse crow roosts is planned for evaluation by the NWRC this winter (B. Blackwell, NWRC, pers. commun.).

Lasers are available with a power of 5 mW (moderate power) and 68 mW (low power). The difference between the lasers is beam intensity and diameter (Glahn et al. 2000). The lasers do not appear to present any detectable ocular hazards to cormorants but do present human safety concerns (Glahn et al. 2000). Both the Desman and Dissuader laser devices which would be used by Wildlife Services to disperse birds are classified as Class-IIIB lasers (OSHA 1991). Lasers in lower ranges of Class-IIIB do not produce hazardous diffuse reflection unless someone intentionally stares at the laser closer to the diffuser (Glahn and Blackwell undated). The lasers can cause temporary flash blindness, afterimage, and glare in people (Glahn and Blackwell, undated). It is recommended that lasers not be pointed a people (Glahn et al. 2000). These lasers cost \$5,700 to \$7,500 each and this may be a disadvantage (Glahn et al. 2000). A modified Avian Dissuader™ became available in 2001 for \$850.

Rejex-It (fogger) is a chemical, non-lethal technique which is registered with the Environmental Protection Agency for dispersing birds. Rejex-It TP 40 has a supplemental label allowing the use of Rejex-It in thermal or mechanical fog generators. The label allows the use of Rejex-It TP 40 fog to repel birds from roosting areas and other areas. The active ingredient in Rejex-It is methyl anthranilate. Inactive ingredients in Rejex-It TP40 include limonene, a human irritant (L. Clark, NWRC, pers. commun.). Limonene is added to Rejex-It TP 40 to make it float on water (L. Clark, NWRC, pers. commun.). Fogging is not recommended for urban/suburban areas because of cloud drift and chemical sensitivity of the public (L. Clark, NWRC, pers. commun.). The public would be concerned with odor sensitivity and allergic reaction to methyl anthranilate.

Rejex-It TP 40 fogger has variable effectiveness on birds and is thought to work best on passerines and waterfowl (L. Clark, NWRC, pers. commun.). Stevens and Clark (1998) found starlings were irritated by exposure to methyl anthranilate as an aerosol and did not habituate to the aerosol. Additionally, birds may habituate to fogging (L. Clark, NWRC, pers. commun.). Belant et al. (1996) found Canada geese habituated or developed tolerance for methyl anthranilate when applied to turf. The use of a fog may repel other desirable birds and it leaves a strong

grape odor which may persist for several days. Finally, Stevens and Clark (1998) cautioned that an irritation response in the laboratory does not directly translate into an avoidance response in the field. The active ingredient methyl anthranilate is described in more detail in Appendix B of the environmental assessment.

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