ENVIRONMENTAL ASSESSMENT (EA)

BIRD DAMAGE MANAGEMENT IN THE ARIZONA ANIMAL DAMAGE CONTROL PROGRAM

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1.0 CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

Across the United States, wildlife habitat has been substantially changed as human populations expand and land is used for human needs. These human uses and needs often compete with wildlife which increases the potential for conflicting human-wildlife interactions. In addition, certain segments of the public strive for protection for all wildlife. Such protection can create localized conflicts between human and wildlife activities. The Final Environmental Impact Statement (FEIS) for the USDA/APHIS/Animal Damage Control (ADC) program summarizes the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1994):

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

USDA/APHIS/Animal Damage Control (ADC) is authorized by Congress to manage a program to reduce human/wildlife conflicts, and this Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts with bird species in Arizona. Individual actions on the types of sites encompassed by this analysis could each be categorically excluded under the APHIS Implementing Regulations for compliance with the National Environmental Policy Act (NEPA) (7 CFR 372.5(c)). This analysis covers ADC's plans for current and future actions on the kinds of sites and areas described in the EA.

ADC is a cooperatively funded and service oriented program. Before any wildlife damage management is conducted, *Agreements for Control* or *ADC Work Plans* must be signed by ADC and the land owner/administrator. ADC cooperates with appropriate land and wildlife management agencies, as requested, to effectively and efficiently resolve wildlife damage problems in compliance with all applicable federal, state, and local laws.

1.1.1 ADC Program

ADC's mission, developed through its strategic planning process, is two-fold. Its 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).

1.2 Purpose

This EA analyzes starling (*Sturnus vulgaris*), blackbird (the blackbird group), feral domestic pigeon (*Columbia livia*), and raven (*Corvus corax* and *C. cryptoleucus*) damage management, hereinafter referred to as Bird Damage Management (BDM) for the protection of livestock feed, livestock, livestock health, property, threatened and endangered species and human health and safety in the State of Arizona. Hereinafter, blackbirds refers to the blackbird group as described in the FEIS prepared by the ADC program (USDA 1994). The blackbird group comprises the Subfamily Icterinae, including red-winged (*Agelaius phoeniceus*), tricolored (*A. tricolor*), rusty (*Euphagus carolinus*), brewer's (*E. cyanocephalus*), and yellow-headed blackbirds (*Xanthocephalus xanthocephalus*); brown-headed cowbird (*Molothrus ater*) and bronzed cowbird (*Tangavius aeneus*); and great-tailed grackle (*Cassidix mexicanus*), and common grackle (*Quiscalus quiscula*).

The State encompasses 72.7 million acres in 15 counties. During FY 1995, ADC had agreements to conduct BDM on 3,371 acres of private land in 4 counties (Maricopa, Yuma, Pinal, and Cochise) (MIS 1996). ADC generally only conducts BDM actions on a portion of the properties under Agreement in any one year; in FY 1995 that portion was 46% or 1,546 acres. ADC has *Agreements for Control* with 24 dairies and feedlots in the State of Arizona. In FY-1995, 10 of those operators in 4 counties (Maricopa, Yuma, Pinal and Cochise) requested assistance, and ADC provided operational BDM service to 8 cattle feedlots and 2 dairies.

1.3 Need For Action

1.3.1 Summary of Proposed Action

The proposed action is to continue the current ADC BDM activities in the State for the protection of livestock feed, livestock, livestock health, property, threatened and endangered species and human health and safety. A major goal of the program is to minimize loss or the risk of loss of livestock feed and the risk of bird-related livestock health problems caused by starlings and blackbirds at dairies and feedlots. The program would also operate to minimize damage or risk of damage to property and human health and safety caused by birds. To meet these goals, ADC would have the objective of responding to all requests for assistance with, at a minimum, technical assistance or self-help advice, or, where appropriate and when cooperative funding is available, direct control assistance in which professional ADC specialists conduct damage management actions. An Integrated Wildlife Damage Management (IWDM) approach would be implemented which would allow use of all legal techniques and methods, used singly or in combination, to meet requestor needs for resolving conflicts with birds. Livestock feeders, dairies, and others requesting assistance would be provided with information regarding the use of effective nonlethal and lethal techniques. Lethal methods used by ADC would include shooting, trapping, and DRC-1339 (Starlicide). BDM 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 Bird Damage Management for Protection of Livestock Feed

1.3.2.1 Contribution of Livestock to the Economy

Agriculture generates nearly $1.9 billion in annual sales of farm and ranch commodities in Arizona. Livestock production, primarily of cattle, hogs, and sheep, is one of the primary agricultural industry sectors and accounts for about 44% of total farm commodity cash receipts (USDA-AASS 1995).

Livestock production in Arizona contributes substantially to local economies. In 1994 there were an estimated 830,000 cattle and calves in the State valued at more than $506 million. Between 1988 and 1995, an average of 4,514 operators ran 875,000 cattle and calves valued at $527 million annually (USDA-AASS 1995).

Arizona's feedlots marketed 377,000 heads valued at $147 million during 1994. As of April 1, 1995, there were 192,000 head of cattle and calves on feed for the slaughter market in Arizona. Of these, 174,000 were steers and steer calves, and 18,000 were heifers and heifer calves. Between 1988 and 1995 an average of 12 livestock feed operators marketed 340,000 head of cattle and calves (USDA-AASS 1995). ADC provided BDM services to 8 of these cattle feedlot operators in FY-95.

The average number of milk cows maintained by Arizona's dairy operations was 116,000 head during 1994. Milk production per cow during 1994 was 18,397 pounds totaling 2.13 billion pounds Statewide. Producer cash receipts totaled $278.5 million. Between 1990 and 1995, Arizona's dairies had 101,000 milk cows which produced 1.8 billion pounds of milk valued at $240 million. Between 1990 and 1995, dairies fed an average of 419,000 tons of grain valued at $61 million annually (USDA-AASS 1995). ADC provided BDM services to two dairies in FY-95.

1.3.2.2 Scope of Livestock Feed Losses

The problem of starling damage to livestock feed has been documented in France and Great Britain (Feare 1984), and in the United States (Besser et. al. 1968). As the science of raising cattle for slaughter progressed from range to feedlot operations, the starling problem intensified. The concentration of larger numbers of cattle eating huge quantities of feed in confined pens provides a tremendous feeding opportunity for starlings, blackbirds, and feral domestic pigeons. Along with this intensive development in animal husbandry came the concept of the complete diet. A complete diet ration is one that contains all of the nutrients and fibre that cattle need. The various ingredients in this ration are so thoroughly mixed that cattle are unable to select any one at the expense of others. The basic constituent of most rations is silage and the high energy portion is usually provided as barley, which may be incorporated as whole grains, crushed or ground cereal. While cattle cannot select ingredients from that ration, starlings can and do select the barley, thereby altering the energetic value of the complete diet. The removal of this high energy fraction by starlings, is believed to reduce milk yields, weight gains, and is economically significant (Feare 1984). Glahn and Otis (1986) reported that starling damage was also associated with proximity to roosts, snow, and freezing temperatures and the number of livestock on feed.

The economic significance of feed losses to starlings has been demonstrated by Besser et. al (1968) who concluded that the value of losses in feedlots near Denver, Colorado was $84 per 1,000 birds in 1967. Forbes (1995) reported starlings consume up to 50% of their body weight in feed each day. Glahn and Otis (1981) reported losses of 4.8 kg of pelletized feed consumed per 1,000 bird minutes. Glahn (1983) reported that 25.8% of farms in Tennessee experienced starling depredation problems of which 6.3% experienced significant economic loss.

1.3.2.3 Loss of Livestock Feed to Birds

Cooperating livestock feedlot operators and dairy farms in the State reported a total of $46,050 in losses in FY-94 and $42,580 in FY-93. Losses "confirmed" by ADC were $39,250 in FY-96, $52,225 in FY-95, $53,740 in FY-94, and $27,100 in FY-93. These losses occurred with ADC BDM services provided. Because it is difficult to accurately quantify bird damage in such situations, the confirmed losses are determined based on professional "best estimates".

A large cattle feeding operation in the panhandle of Texas had upwards of 1,000,000 blackbirds and starlings using the facility per day. This estimate was made by trained ADC field personnel. The operators had a similar facility that did not have bird damage problems. They reported that, based on a comparison of feed losses, livestock health problems (primarily coccidiosis), and water trough maintenance costs (continuous labor costs for cleaning bird droppings out of water troughs), bird damage was costing them about $5,000/day (R. Smith, ADC, Canyon District, TX, pers. comm.).

Appendix B contains an analysis of feed losses based on reported bird consumption rates and feeding habits at cattle feeding facilities and estimated bird numbers observed by ADC personnel at cooperating facilities in FY 95. This analysis *conservatively* estimates that the value of feed losses on cooperating feedlots and dairies would have been about $120,000 *without* ADC BDM services in FY 1995 (see Appendix B).

1.3.2.4 Need for Bird Damage Management for Protection of Livestock, Livestock Health, Property, and Human Health and Safety.

Starlings, blackbirds, feral domestic pigeons, and ravens occasionally impact resources other than livestock feed for which ADC is requested to provide BDM actions. These resources include:

- Livestock - Ravens will sometimes attack young lambs, calves, and goats, and even adult ewes, nannies, and cattle in certain situations, by pecking the eyes and other vulnerable spots such as the anal area, nose and navel (Larsen and Dietrich 1970; Wade and Bowns 1982). They can kill young animals by pecking through the eye sockets and into the brain. In FY-95, ravens were responsible for the loss of 5 young goats (kids) valued at $180. In FY-94, ravens were responsible for the loss of 9 goat kids valued at $360 and 2 calves valued at $800.

- Livestock Health - Blackbirds and starlings have been implicated in the transmission of livestock diseases. Transmission of diseases such as Transmissible Gastroenteritis Virus (TGE), Tuberculosis (TB), and Coccidiosis has been linked to migratory flocks of starlings and blackbirds. Estimates of the dollar value of this type of damage are not available. A consulting veterinarian for a large cattle feeding facility in Texas indicated problems associated with coccidiosis declined following reduction of starling and blackbird numbers using the facility (R. Smith, ADC, Canyon District, TX, pers. comm.).

- Property - Birds occasionally damage structures on private property or public facilities with fecal contamination. Corrosion damage to metal structures and painted finishes can occur when concentrations of birds roost on or over such structures. People concerned about this nuisance request ADC assistance. Fruit or nut crops, especially pecans, can be severely damaged by blackbirds and ravens. In FY-95, ravens damaged watermelons valued at $100, and pecans valued at $100. In FY-94, ravens damaged pecans valued at $170. In FY-93, ravens damaged pecans on 2 acres at a value of $1,500.

- Human Health and Safety - ADC occasionally is requested to conduct limited BDM in Arizona to reduce the risk to people posed by these birds. Airports or public facilities may request ADC assistance in resolving potential threats from these birds. The risk that birds pose to aircraft is well documented with the worst case reported in Boston in 1960 when 62 people were killed in the crash of an airliner which collided with a flock of starlings (Terres 1980). Feral domestic pigeons and Starlings have been suspected in the transmission of 29 different diseases to humans (Rid-A-Bird 1978, Weber 1979, and Davis et.al. 1971).

The fungus *Histoplasma capsulatum* is associated with large quantities of excreta in starling and blackbird roosts (Stickley and Weeks 1985). The disease histoplasmosis is transmitted to man through aerosol inhalation of the fungal spores during activities in roosts. Although this disease is not prevalent in Arizona, control operations as proposed in this alternative could reduce starling populations thereby reducing this threat to human health and safety.

Several studies have shown that blackbirds and starlings can pose a significant economic threat to agricultural producers (Besser et. al. 1968, Dolbeer et.al. 1978, and Feare 1984). To alleviate losses sustained by producers, this alternative proposes using a system of integrated wildlife damage management similar to the one described by Palmer (1976) and Twedt and Glahn (1982). This integrated approach is critical to problem resolution as reported by Dolbeer et.al. (1978) who stated that "*simplistic management schemes are likely to fail in solving the conflicts and they may even exacerbate them.*" Control operations as proposed in this alternative could reduce starling depredation at feedlots without impacting the environment.

1.4 Relationship Of This Environmental Assessment To Other Environmental Documents

ADC has issued a Final Environmental Impact Statement on the national APHIS/ADC program (USDA 1994). Pertinent information available in the FEIS has been incorporated by reference into this EA.

1.5 Decision To Be Made

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

- Should BDM as currently implemented be continued on private property sites or public facilities in the State?
- If not, how should ADC fulfill its legislative responsibilities for managing bird damage on private property sites or public facilities in the State?
- Might the proposal have significant impacts requiring preparation of an EIS?

1.6 Scope Of This Environmental Assessment Analysis

1.6.1 Actions Analyzed. This EA evaluates bird damage management to protect livestock feed, livestock, livestock health, property, and human health and safety on private land or public facilities within the State.

1.6.2 Properties Not Currently Part of the Operational ADC Wildlife Damage Management Program. The current program only operates on a small percentage of properties in the state. Because the current program's mission is to provide assistance wherever requested and when funds permit, this EA analyzes impacts not only at current program levels, but at potentially increased program levels should nonparticipating individuals or agencies decide to enter the program.

1.6.3 Period for Which this EA is Valid. This EA will remain valid until ADC 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 BDM activities.

1.6.4 Site Specificity. This EA analyzes potential impacts of BDM and addresses ADC's BDM activities on private property sites or public facilities under *Agreements For Control* within the State. It also addresses the impacts of BDM on areas where additional agreements with ADC may be written in the reasonably foreseeable future. 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 additional BDM efforts could occur. Thus, this EA anticipates this potential expansion and analyzes the impacts of such expanded efforts as part of the current program. The EA emphasizes significant issues as they relate to specific areas whenever possible. However, the issues that pertain to bird damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard ADC Decision Model (Slate et al. 1992) and ADC Directive 2.105 is the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by ADC in the State (See USDA 1994, Chapter 2 and Appendix N for a more complete description of the ADC Decision Model and examples of its application). Decisions made using the model will be in accordance with any mitigations and standard operating procedures described herein and adopted or established as part of the decision.

1.7 Authority and Compliance

1.7.1 Authority of Federal and State Agencies in Wildlife Damage Management in Arizona[1]

1.7.1.1 ADC Legislative Mandate

The primary statutory authority for the ADC program is the Animal Damage Control Act of 1931, 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, ADC 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 mandate of ADC with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

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[1] See Chapter 1 of USDA 1994 for a complete discussion of federal laws pertaining to ADC.

"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."

1.7.1.2 Arizona Department of Agriculture (ADA)

The ADA currently has a Cooperative Agreement with ADC dated June 1, 1994 and under the authority of Arizona Revised Statutes (ARS) 3-2401 cooperates with ADC to alleviate wildlife depredations. These documents establish a cooperative relationship between ADC and ADA, outline responsibilities, and set forth objectives and goals of each agency for resolving wildlife damage management conflicts in Arizona.

1.7.1.3 Proposition 201 -- An Initiative Measure Amending ARS 17-301

Proposition 201 prohibits the use of traps, snares, and poisons to take wildlife on Federal, State, County, or City land in the State of Arizona. Exceptions include protection of human health and safety, wildlife disease surveillance, scientific research, wildlife relocation, aquatic wildlife management, and non-furbearing rodent control. ADC BDM actions that involve the use of toxicants or traps are conducted on private lands or public facilities in compliance with one of the exceptions noted above.

1.7.2 COMPLIANCE WITH FEDERAL LAWS.

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

1.7.2.1 National Environmental Policy Act (NEPA)

ADC 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 Arizona.

1.7.2.2 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)). ADC conducts Section 7 consultations with the U.S. Fish & Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that *"any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available"* (Sec.7(a)(2)). ADC has obtained a Biological Opinion from USFWS describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1994, Appendix F).

1.7.2.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect species of birds that migrate outside the United States. The law prohibits any "take" of these species, except as permitted by the USFWS; therefore the USFWS issues permits for managing bird damage situations. Starlings and feral domestic pigeons are not classified as migratory birds and therefore have no protection under this Act. A federal permit is not required to control blackbirds, crows, or magpies when found committing or about to commit depredations (50 CFR 21.43).

1.7.2.4 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 ADC program in Arizona are registered with and regulated by the EPA, and the ADA, and used by ADC in compliance with labeling procedures and requirements.

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

The NHPA requires: 1) federal agencies to evaluate the effects of any federal undertaking on cultural resources, 2) 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. ADC has determined BDM 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.

2.0 CHAPTER 2 - ISSUES

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), issues that were used to develop mitigation measures and standard operating procedures, 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 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 Target Bird Species Populations
- Effects on Nontarget Species populations, including T&E Species
- Safety and Efficacy of Chemical Control Methods
- Does the value of livestock feed saved equal or exceed the cost of providing BDM service at cattle feeding facilities?

2.2 Issues Used to Develop Mitigation

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

A common concern among members of the public and wildlife professionals, including ADC personnel, is the impact of damage control methods and activities on nontarget species, particularly Threatened and Endangered Species. ADC's standard operating procedures 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 Threatened and Endangered Species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. ADC has consulted with the USFWS concerning potential impacts of ADC 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 1994, Appendix F).

2.2.2 Safety and Efficacy of Chemical Control Methods

Under the alternatives proposed in this EA, the primary toxicant proposed for use by ADC is DRC-1339 (Starlicide). DRC-1339 is regulated by the EPA through FIFRA, by Arizona State Pesticide Control Laws, and by ADC Directives. Based on a thorough Risk Assessment, APHIS concluded that, when ADC program chemical methods, including those referenced above, 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 1994).

DRC-1339 is one of the most extensively researched chemical control methods ever investigated. It causes a quiet and apparently painless death and death occurs without convulsions or spasms (USDA 1994 and 1995). DRC-1339 is highly selective to certain bird species, especially starlings, and blackbirds.

2.3 Issues Not Considered in Detail With Rationale

2.3.1 ADC's impact on Biodiversity

No ADC wildlife damage management in Arizona is conducted to eradicate a wildlife population. ADC operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Any reduction of a local population or group is frequently temporary because immigration from adjacent areas or reproduction soon replaces the animals removed. Impacts on target and nontarget species populations because of ADC's lethal BDM are minor as shown in section 4.1. The impacts of the current ADC program on biodiversity are not significant nationwide or statewide (USDA 1994). ADC operates on a relatively small percentage of the land area of the State, and ADC take is a small proportion of the total population of any species as analyzed in Chapter 4.

2.3.2 Wildlife damage is a cost of doing business -- a "Threshold of Loss" should be established before allowing any lethal bird damage management.

ADC is aware of concerns that federal wildlife damage management should not be allowed until economic losses become unacceptable. This type of policy would be inappropriate to apply to human health and safety situations. Although some losses can be expected and tolerated by livestock producers, ADC has the legal direction to respond to requests for wildlife damage management, and it is program policy to aid each requester to minimize losses. ADC uses the Decision Model discussed in Chapter 3 to determine an appropriate strategy.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part the court found that a forest supervisor need only show that damage from wildlife is threatened, to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993).

2.3.3 Wildlife damage management should not occur at taxpayer expense, but should be fee based.

ADC is aware of concerns that wildlife damage management should not be provided at the expense of the taxpayer or that it should be fee based. ADC was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for ADC comes from a variety of sources in addition to federal appropriations. Such nonfederal sources include State general appropriations, local government funds (county or city), livestock associations, Indian tribes, and private funds which are all applied toward program operations. Federal, state, and local officials have decided that ADC should be conducted by appropriating funds. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since wildlife management is a government responsibility. A commonly voiced argument for publicly funded wildlife damage management is that the

public should bear responsibility for damage to private property caused by public wildlife.

Although not required by law, it is current practice to require livestock feeding facilities to pay 100% of the cost of labor and materials in providing BDM services in Arizona. Thus, for the primary focus of the program in the State, BDM is fee based to a high degree.

2.3.4 American Indian and Cultural Resource Concerns

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. ADC 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. The Arizona State Historic Preservation Office (SHPO) indicated certain BDM methods such as noise-producing scaring devices could constitute "undertakings" as defined by the NHPA that could adversely affect the visual or audible elements of certain kinds of historic properties if used at or adjacent to such properties. Similarly, these types of activities could conceivably affect properties of traditional cultural value to American Indian Tribes that are outside of tribal lands. In situations where this might occur, ADC will consult with the SHPO and potentially affected tribes to avoid adverse impacts. Other types of ADC BDM actions do not cause ground disturbances nor do they otherwise have the potential to affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. ADC may be asked to assist in protecting properties and structures that are experiencing damage caused by birds and thus could potentially benefit historic properties.

Impacts on sites or resources protected under NHPA : With the possible exception of certain types of habitat alteration methods and noise-producing scaring techniques (see section 2.3.4), ADC BDM actions are not undertakings that could adversely affect historic resources. ADC would consult with the SHPO on actions involving the above exceptions in situations where such activities have the potential to adversely affect historic properties.

2.3.5 Lethal BDM is futile because 50-60% of blackbird and starling populations die each year anyway.

Because natural mortality in blackbirds populations is 50 - 65% per year (see section 4.1.1.1), some persons argue that this shows lethal BDM actions are futile. However, the rate of natural mortality has little or no relationship to the effectiveness of lethal BDM because natural mortality generally occurs randomly throughout a population and throughout the course of a year. Natural mortality is too gradual in individual concentrations of depredating birds to adequately reduce the damage that such concentrations are causing. It is probable that mortality caused by BDM actions is not additive to natural mortality but merely displaces it. In any event, it is apparent that the rate of mortality from BDM is well below the extent of any natural fluctuations in overall annual mortality and is, therefore, insignificant to regional populations. The objective of

lethal BDM is not to necessarily add to overall blackbird or starling mortality, which would be futile under current funding limitations, but to redirect mortality to a segment of the population that is causing damage in order to realize benefits during the current production season. The resiliency of these bird populations does not mean individual BDM actions are not successful in reducing damage, but that periodic, perhaps annual, BDM actions are necessary in many damage situations.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 Alternatives analyzed in detail are:

1) Alternative 1 - Continue the Current Federal BDM 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 - No Federal ADC BDM. This alternative consists of no federal BDM.

3) Alternative 3 - Technical Assistance Only. Under this alternative, ADC would not conduct any direct operational BDM activities in Arizona. If requested, affected producers would be provided with technical assistance information only.

4) Alternative 4 - Nonlethal Required Before Lethal Control. This alternative would not allow any lethal control by ADC until nonlethal methods have been tried and found to be inadequate in each depredation situation.

3.2 Description of The Alternatives

3.2.1 ALTERNATIVE 1 - Continue the Current Program (the Proposed Action)

A brief description of the proposed action was presented in Chapter 1, section 1.3.1. The discussion that follows contains further information intended to foster understanding of the proposed action.

Integrated Wildlife Damage Management (IWDM)

During more than 70 years of resolving wildlife damage problems, ADC has considered, developed, and used numerous methods of managing damage problems (USDA 1994, P. 2-15). The efforts have involved the research and development of new methods, and the implementation of effective strategies to resolve wildlife damage.

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and control of damage caused by wildlife based on local problem analyses and the informed judgement of trained personnel. The ADC Program applies IWDM, commonly known as Integrated Pest Management (IPM) (ADC Directive 2.105), to reduce damage through the ADC Decision Model (Slate et. al. 1992) described in the FEIS. A complete discussion of the ADC decision model is presented in (USDA 1994).

The philosophy behind IWDM is to implement effective management techniques in a cost effective[1] manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances.

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

IWDM may incorporate cultural practices (i.e., animal husbandry), habitat modification, animal behavior (i.e., scaring), local population reduction, or any combination of these, depending on the characteristics of the specific damage problems. In selecting management techniques for specific damage situations consideration is given to:

- Species responsible
- Magnitude of the damage
- Geographic extent of damage
- Duration and frequency of the damage
- Prevention of future damage (lethal and nonlethal techniques)

The IWDM strategies that ADC employs consist of:

Technical Assistance Recommendations (implementation is the responsibility of the requestor): ADC personnel provide information, demonstrations, and advice on available wildlife damage management techniques. Technical assistance includes demonstrations on the proper use of management devices (propane exploders, cage traps, etc.) and information on animal husbandry, habits and habitat management, and animal behavior modification that can reduce damage problems. Technical assistance is generally provided following an on-site visit or verbal consultation with the requestor. Generally, several management strategies are described to the requestor for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and practical application. Technical assistance may require substantial effort by ADC personnel in the decision making process, but the actual management is the responsibility of the requester.

Direct Control Assistance (activities conducted or supervised by ADC personnel): Direct control assistance is implemented when the problem cannot effectively be resolved through technical assistance, and when Cooperative Agreements provide for ADC direct control assistance. The initial investigation defines the nature and history of the problem, extent of damage, and the species responsible for the damage. Professional skills of ADC personnel are often required to effectively resolve problems, especially if restricted pesticides are proposed, or the problem is complex requiring the direct supervision of a wildlife professional. ADC considers the biology and behavior of the damaging species and other factors using the ADC decision model (Slate et al. 1992). The recommended strategy(ies) may include any combination of preventive and corrective actions that could be implemented by the requestor, ADC, or other agency, as appropriate. Two strategies are available:

1. **Preventive Damage Management.** Preventive damage management is applying wildlife damage management strategies before damage occurs, based on historical damage problems. As requested and appropriate, ADC personnel provide information and conduct demonstrations or take action to prevent these historical problems from recurring. Preventive damage management can take place on private lands without special authorization.

2. **Corrective Damage Management** Corrective damage management is applying wildlife damage management to stop or reduce current losses. As requested and appropriate, ADC personnel provide information and conduct demonstrations or, with the appropriate signed agreement, take action to prevent additional losses from recurring. For example, in areas where livestock feed depredation is occurring, ADC may provide information about exclusionary techniques, animal

husbandry, mechanical scare devices, and pyrotechnics, or conduct operational damage management to stop the losses.

Bird Damage Management Methods Available for Use

A number of methods are available for consideration in bird damage situations:

Nonlethal Methods

Agricultural producer 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 livestock producer. Producers are encouraged to use these methods, based on the level of risk, need, and professional judgement on their effectiveness and practicality (USDA 1992). Producer practices recommended by ADC include:

- **Cultural methods.** These 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). Increased feed size may reduce consumption by starlings but may not be cost effective for the producer (Twedt and Glahn 1984).

- **Animal behavior modification.** This refers to tactics that alter the behavior of wildlife and reduce damages. Animal behavior modification may use scare tactics or fencing to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some but not all devices used to accomplish this are:

    - Bird-proof fences and feeders
    - Electronic guards
    - Propane exploders
    - Pyrotechnics
    - Distress Calls and sound producing devices
    - Chemical frightening agents
    - Repellents

These techniques are generally only practical in small feedlot situations. Scaring devices such as distress calls, helium filled eye spot balloons, and moving disks can be 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 et.al. 1983, and Arhart 1972). Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et.al. 1986, and Tobin et.al. 1988).

Bird proof fencing could be effective but is generally cost-prohibitive in most situations, particularly because of the aerial mobility of birds which requires overhead barriers as well as conventional. Fencing adequate to stop bird movements can also restrict movements of livestock and other wildlife (Fuller-

Perrine and Tobin 1993). Heavy plastic strips hung vertically in open doorways have been successful in some situations in excluding birds (Johnson and Glahn 1994). The plastic strips, however, can prevent filling of the feed troughs at livestock feeding facilities or can be covered up when the feed is poured into the trough by the feed truck. They are not practical for open-air feedlot operations that are not housed in buildings.

Scaring devices such as propane exploders are often not practical under large feedlot situations because of the disturbance to livestock, although livestock will habituate to the noise. Birds quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Chemical frightening agents such as Avitrol work well in some situations. Avitrol is not completely nonlethal in that a small portion of the birds are killed. This chemical works by causing distress behavior in the birds that consume treated bait kernels which generally frightens the other birds from the site. Avitrol is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations in which only a portion of the individual grains carry the chemical. Birds that eat the treated portion of the bait behave erratically and give warning cries that frighten other birds from the area. Generally birds that eat the treated bait will die (Johnson and Glahn 1994).

Methyl anthranilate is currently under investigation as a potential bird taste repellent. If successful, this grape flavoring may become available for use as a livestock feed additive (Mason et.al. 1984; 1989). Naphthalene (moth balls) has proven to be ineffective as a bird repellent (Dolbeer et.al. 1988). Methiocarb is a taste repellent that has also been proven ineffective in inhibiting overall consumption of feed by birds (Tobin 1985).

Alpha-chloralose is an oral tranquilizing agent that can be used to capture birds but is often not cost effective and very labor intensive (Wright 1973; Feare et.al. 1981). The drug is currently only registered for use in capturing waterfowl, feral domestic pigeons, and coots.

Lethal Methods

Traps and Shooting

1. Decoy and nest box traps are used by ADC for preventive and corrective damage management. Decoy traps are set in limited numbers in selected locations where a resident population is causing localized damage or where other techniques cannot be used. Decoy traps are similar in design to the Australian Crow Trap as reported by Johnson and Glahn (1994) and McCracken (1972). Live decoy birds are placed in the trap with sufficient food and water to assure their survival. Feeding behavior and calls of the decoys attract other birds into the trap.

   Nest box traps are effective in capturing local breeding and post breeding starlings in limited areas (DeHaven and Guarino 1969; Knittle and Guarino 1976). Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method of starling control.

Trapped birds are euthanized. Because problem bird species are highly mobile and can easily return to damage sites from long distances, relocation to other areas following live capture would not be effective. Since starlings, blackbirds, feral domestic pigeons, and ravens are numerous throughout Arizona, they are rarely if ever relocated because habitats in other areas are generally already occupied. Translocation of wildlife is discouraged by ADC policy (ADC Directive 2.501) because of stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats. Other localities and land managing agencies are frequently reluctant to accept nonindigenous species such as feral domestic pigeons and starlings because of the problems these bird cause.

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

Chemical Management Methods.

All chemicals used by ADC are registered under FIFRA (administered by the EPA and ADA) or by the Food and Drug Administration (FDA). ADC personnel that use chemical methods are certified as pesticide applicators by ADA and are required to adhere to all certification requirements set forth in FIFRA and Arizona state pesticide control laws and regulations. Chemicals are only used on private, public or tribal property sites with authorization from the property owner/manager. The use of chemical toxicants to take wildlife on public lands in Arizona (including state, FS, BLM, and local government) is much more restrictive since the passage of Proposition 201. Chemical control methods can only be used on public lands for the protection of human health and safety, wildlife research, and for rodent control.

The primary chemical method that would be used in the proposed action is DRC-1339 (Starlicide). For over 30 years, DRC-1339 has proven to be an effective method of starling control at feedlots (West et.al. 1967, Besser et.al. 1967 and Decino et.al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving starling problems at feedlots (West and Besser 1976 and Glahn 1982, and Glahn et.al. 1987).

DRC-1339 is a slow acting avicide that is registered with the EPA for the control of several species of birds, including blackbirds, starlings, feral domestic pigeons, crows, ravens, magpies, and gulls. DRC-1339 was developed as an avicide because of its differential toxicity to animals. More acute avian toxicity data are available

for DRC-1339 than for any other pesticide used in the world. More than 40 species have been tested. DRC-1339 is highly toxic to sensitive species but only slightly toxic to nonsensitive birds, predatory birds, and mammals. For example, starlings, a highly sensitive species, require a dose of only 0.3 mg per bird to cause death (Royall et.al 1967). Most bird species that are responsible for damage, including starlings, blackbirds, feral domestic pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other bird species such as raptors, sparrows, and eagles are classified as nonsensitive (USDA 1995).

Numerous studies show that DRC-1339 poses a small risk of primary poisoning to nontarget and threatened and endangered species (USDA 1994). Secondary poisoning has not been observed with DRC-1339 treated baits -- 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). DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation. 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., chemicals left after breakdown) have low toxicity. Aquatic and invertebrate toxicity are low (USDA 1994).

The ADC FEIS, Appendix P contains a thorough risk assessment of DRC-1339 and the reader is referred to that source for a more complete discussion (USDA 1994). That assessment concluded that no adverse effects are expected from use of DRC-1339.

The Arizona ADC program used an average of 22,605 grams of DRC-1339 during each of the past 5 years. Annual usage during that period ranged from 13,962 grams in FY-1993 to 26,280 grams in FY-1991.

Other BDM chemicals that might be used or recommended by ADC if they become registered would be nonlethal repellents such as methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption) which is currently being investigated as a livestock feed additive. 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.

3.2.2 ALTERNATIVE 2 - No Federal ADC Bird Damage Management

This alternative would consist of no federal involvement in BDM 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 ADC. Information on future developments in nonlethal and lethal management techniques that culminate from research efforts by ADC's research branch would still be available to producers. They would be left with the option to conduct their own bird damage control efforts. DRC-1339 is currently only available for use by ADC employees. Therefore use of this chemical by private individuals would be illegal.

3.2.3 ALTERNATIVE 3 - Technical Assistance Only

This alternative would not allow ADC operational BDM in the State. ADC would only provide technical assistance and make recommendations when requested. Producers, state agency personnel, or others could conduct BDM activities including the use of traps, shooting, and any nonlethal methods they deem effective. DRC-1339 is currently only available for use by ADC employees. Therefore use of this chemical by private individuals would be illegal.

3.2.4 ALTERNATIVE 4 - Nonlethal Control Required Before Lethal

This alternative would allow no use of lethal methods by ADC in the State as described under the proposed action until nonlethal methods have been employed in a given damage situation and found to be ineffective or inadequate. No preventive lethal control would be allowed. Producers would still have the option of implementing their own lethal control measures as described in sections 3.2.2 and 3.2.3.

3.3 Alternatives Considered But Not Analyzed in Detail With Rationale

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

3.3.1 Compensation for Bird Damage Losses

The Compensation alternative would require the establishment of a system to reimburse persons impacted by bird damage. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, ADC would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the FEIS indicated that the concept has many drawbacks (USDA 1994):

- It would require larger expenditures of money and labor to investigate and validate all losses, and determine and administer appropriate compensation.
- Compensation would most likely be below full market value. It is difficult to make timely responses to all requests to assess and confirm losses, and many losses could not be verified. For example, it would be impossible to prove conclusively in individual situations that birds were responsible for disease outbreaks even though they may actually have been responsible. Thus, a compensation program that requires verification would not meet its objective for mitigating such losses.
- Compensation would give little incentive to livestock owners to limit losses through improved animal husbandry practices and other management strategies.
- Not all producers would rely completely on a compensation program and unregulated lethal control would most likely continue as permitted by state law.
- Compensation would not be practical for reducing threats to human health and safety.

3.3.2 Bounties

Payment of funds for killing birds (bounties) suspected of causing economic losses is not supported by Arizona State agencies such as AGFD and ADA. ADC also does not support this concept because:

- ADC does not have the authority to establish a bounty program.
- Bounties are generally not effective in controlling damage.
- Circumstances surrounding take of animals are completely unregulated.
- There is a tendency for fraudulent claims to occur. It is difficult or impossible to prevent claims for problem birds taken from outside damage management areas.

3.3.3 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all ADC program efforts toward total long term elimination of bird populations on private, state, local government, and tribal lands within entire cooperating counties or larger defined areas in the State.

In Arizona, eradication of native bird species (the starling and feral domestic pigeon are not native to North America) is not a desired population management goal of state agencies. Although generally difficult to achieve, eradication of a local population of feral domestic pigeons or starlings may be the goal of individual BDM projects if decided through use of the ADC Decision Model. This is because feral domestic pigeons and starlings are not native to North America and are only present because of human introduction. However, eradication as a general strategy for managing bird damage will not be considered in detail because:

- ADC opposes eradication of any native wildlife species.
- AGFD and ADA oppose eradication of any native Arizona wildlife species.
- Eradication is not acceptable to most members of the public.
- Because blackbirds and starlings are migratory and most winter populations are comprised of winter migrants from northern latitudes, eradication would have to be targeted at the entire North American populations of these species to be successful. That would not be feasible or desirable.
- Region or statewide attempts at eradication of any native or nonindegenous bird species would be next to impossible under the restrictions on methods and areas where certain BDM methods can be used in Arizona.

Suppression would direct ADC program efforts toward managed reduction of certain problem populations or groups. In areas where damage can be attributed to localized populations of birds, ADC can decide to implement local population suppression as a result of using the ADC Decision Model. However, with the constraints on control methods established in Arizona, localized population suppression is difficult to maintain except for short time periods. Problems with the concept of suppression are similar to those described above for eradication.

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

3.4 Mitigation and Standard Operating Procedures for Bird Damage Management Techniques

3.4.1 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 ADC program, nationwide and in Arizona, uses many such mitigation measures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1994). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into ADC's Standard Operating Procedures include:

- The ADC Decision Model which is designed to identify effective wildlife damage management strategies and their impacts.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid impacts to T&E species.
- EPA-approved label directions are followed for all pesticide use.
- All ADC Specialists in the State who use restricted chemicals are trained and certified by, or else operate under the direct supervision of, program personnel or others who are experts in the safe and effective use of chemical BDM materials.
- The presence of nontarget species is monitored before using DRC-1339 to control starlings and blackbirds at feedlots to reduce the risk of significant mortality of nontarget species populations.
- Research is being conducted to improve BDM 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.

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.
- ADC uses BDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1994, 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.

3.4.2 Additional Mitigation specific to the issues

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

3.4.2.1 Effects on Target Species Populations

- BDM 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.
- ADC take is monitored by comparing numbers of birds killed by species or species group (e.g., blackbirds) with regional or nationwide populations to assure the magnitude of take is maintained below the level that would impact the viability of native species populations (See Chapter 4).

3.4.2.2 Effects on Nontarget Species Populations Including T&E Species

- ADC personnel are highly trained and experienced to select the most appropriate method for taking problem animals and excluding nontargets.

- Preliminary observations of birds feeding at feedlots or dairies are made to determine if nontarget or T & E species would be at significant risk from BDM activities.

- ADC has consulted with the USFWS regarding potential impacts of all current 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 1994). Further consultation on species not covered by or included in these formal consultation processes has been initiated and ADC will abide by any RPAs, RPMs, and terms and conditions that result from that process.

- ADC may be called upon to control nest parasitism by cowbirds to protect the endangered southwestern willow flycatcher. This action would provide a positive benefit to this endangered species with no negative impacts to the cowbird population.

Numerous research studies have shown that DRC-1339 has little effect on mammals, is water soluble, does not migrate through the soil, and produces no secondary poisoning (USDA 1995). Based on these research studies, we have concluded that the proposed project will have no effect on any listed or candidate mammal, fish, amphibian, reptile, or plant.

Arizona has 10 listed and 1 candidate bird species in the State (U.S. Fish & Wildlife Service 1996), 5 of which are raptors -- the peregrine falcon (*Falco peregrinus*), bald eagle (*Haliaeetus leucocephalus*), northern aplomado falcon (*Falco femoralis septentrionalis*), Mexican spotted owl (*Strix occidentalis lucida*), and cactus ferruginous pygmy-owl (Glaucidium brasilianum cactorum) (candidate species). Numerous research studies, cited elsewhere in this EA, have shown DRC-1339 does not impact raptors. The 1992 B.O. from USFWS concluded no adverse impacts on the American peregrine falcon, bald eagle, or northern aplomado falcon were likely from ADC's use of DRC-1339. In January of 1995, ADC

requested formal consultation on several species not covered by the 1992 opinion, which included the Mexican spotted owl, and that consultation is pending. However, ADC's chemical uses for BDM have not occurred in or near spotted owl habitat and secondary hazards to raptors have been shown to be virtually nonexistent (USDA 1994, Appendix P). Therefore, we have concluded that the proposed action will have no effect on any listed raptor in the State of Arizona. Of the six remaining listed bird species, the whooping crane (*Grus americana*), Yuma clapper rail (*Rallus longirostris obsoletus*), brown pelican (*Pelecanus occidentalis*), California condor (*Gymnogyps californianus*), and southwestern willow flycatcher (*Empidonax traillii extimus*) have a range, diet, and habits which preclude exposure to any DRC-1339 bait sites. Therefore we have concluded that this project will have no effect on any of the above listed birds in the State of Arizona. The masked bobwhite (*Colinus virginianus ridgewayi*) range is restricted to a captive rearing facility and relocation sites on the Buenos Aires National Wildlife Refuge (Kluvlesky & Dobrott 1995). There are no confirmed sightings of the masked bobwhite off the refuge and studies on the refuge suggest the bird has a home range of approximately one square mile. ADC conducted one feedlot operation approximately 150 miles from this site during the winter of 1994-95. Based on the restricted home range and distribution of the masked bobwhite and the distance from any potential ADC control operation, we have concluded that the proposed project will have no effect on this endangered species. The U.S. Fish & Wildlife Service has been informed of these conclusions and any RPAs or RPMs that are established due to section 7 consultations will be followed to avoid adverse impacts.

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 are greater, lesser, or the same.

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

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

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

Impacts on sites or resources protected under the National Historic Preservation Act: ADC BDM actions are not undertakings that could adversely affect historic resources. Consultation with the Arizona State Historic Preservation Office determined this ADC operation produces no ground disturbances and therefore would have no effect on historic resources.

4.1 Issues Analyzed in Detail

4.1.1 Effects on Target Species Populations

4.1.1.1 Alternative 1. - Continue the Current Federal Bird Damage Management Program (The Proposed Action as described in Chapter 1)

With the exception of feral domestic pigeons, which maintain local residency and are not migratory, population estimates useful for evaluating impacts of BDM actions are only available on a nationwide and regional basis. Therefore, this analysis focuses on regional population impacts. Since the majority of blackbirds and starlings are migratory and range over broad expanses of territory from northern to southern latitudes over the course of a year, this type of analysis is appropriate. BDM work for feedlots and dairies conducted by the Arizona ADC program occurs in the winter following the arrival of migrants. Winter migrants arrive in Arizona from a large area of the western United States and Canada giving credence to the regional scope of this analysis. The northwest and southwest regions as defined by Dolbeer and Stehn (1983) are used in this analysis because the boundaries of these geographical units are based on ecological differences making regions more meaningful in terms of migratory bird problems.

Starling and Blackbird Population Impacts

Colonization of North America by the European Starling began on March 6, 1890 when Mr. Eugene Scheifflin, a member of the Acclimatization Society, introduced 80 starlings into New York's Central Park. The birds thrived and exploited their new habitat. By 1918, less than 30 years after their introduction in New York City, the advance line of migrant juveniles extended from Ohio to Alabama; by 1926 from Illinois to Texas, by 1941 from Idaho to New Mexico, by 1946 to California and Canadian coasts (Miller 1975). In just 50 short years the starling had

colonized the United States and expanded into Canada and Mexico and 80 years after the initial introduction had become one of the most common birds in North America (Feare 1984).

Precise counts of blackbird and starling populations do not exist but one estimate placed the United States summer population of the blackbird group at over 1 billion (USDA 1994) and the winter population at 500 million (Royall 1977). The majority of these birds occur in the eastern U.S., for example surveys in the south eastern part of the country estimated 350 million blackbirds and starlings in winter roosts (Bookhout and White 1981). Meanley and Royal (1976) estimated 538 million blackbirds and starlings in winter roosts across the country during the winter of 1974-75. Of this total 26% or 139 million were in the west.

An extensive population survey by Dolbeer and Stehn published in 1979 showed that, in the southwestern U.S., the number of breeding starlings doubled between 1968 and 1976. In California, where starlings were first observed in 1942, the number of breeding birds increased by 19% during the same period. Breeding Bird Survey data from Hines et al. (1996) indicate a slight increase (0.8% per year) in the starling breeding population in the western U.S. from 1966 -1979, and a slight decrease (2.7% per year) from 1980 - 1994. Red-winged blackbirds showed a gradual increase (2.6% per year) from 1966 - 1979 and a slight decline (1% per year) from 1980 - 1994. Yellow-headed blackbirds showed a 6.4% per year increase from 1966 - 1979 and very slight increase from 1980 - 1994. Brewer's blackbird and the brown-headed cowbird which occur in Arizona show slightly increasing or decreasing trends in the western breeding populations. The bronzed cowbird shows a declining trend in western breeding populations (7.2%/year 1966-1979, and 11.6%/year 1980 - 1994), but the overall trend for North America is increasing (2%/year 1966 - 1994) (Hines et al. 1996).

The nationwide starling population has been estimated at 140 million (Johnson and Glahn 1994). The winter starling population in the northwest and southwest regions has been estimated at 27.8 million (Meanley and Royall 1976). The northwest and southwest regional population of the blackbird group is 139 million of which 27.8 million are starlings (Meanley and Royall 1976).

All of the above information indicates that populations of starlings and blackbirds have been relatively stable in recent years. For most species that show upward or downward trends, such trends have been gradual.

Table A-1 in Appendix B shows that, for the entire FY 95 season, the cumulative total number of blackbirds and starlings at Arizona cattle feeding facilities that requested and received BDM service from ADC was 1,516,000. This total was based on estimates at 10 individual facilities throughout the approximately 150 day winter migrant period when bird problems are prevalent. Similar types of estimates showed that cumulative total numbers of blackbirds and starlings at cooperating facilities were 950,000 in FY 1993, 1,550,000 in FY 1994, and 1,516,000 in FY 1995. These numbers represent a best estimate of the *maximum* potential number of birds that could have been impacted by ADC lethal BDM actions at cattle feeding operations in Arizona in each fiscal year cited.

Research studies and field observations suggest DRC-1339 treatments kill about 75% of the blackbirds and starlings at treated cattle feeding facilities (Besser et.al. 1967). Based on this reported mortality figure, the estimated number of such birds killed by ADC BDM in Arizona by year was: FY 93 -- 712,500; FY 94 -- 1,162,500; and FY 95 -- 1,137,000. Between FY 1990 and 1994, States in the ADC Western Region reported a total kill of between 505,865 and 999,280. The average annual reported kill was 746,082 blackbirds and starlings (MIS 1996).

Natural mortality in blackbird populations is between 50% and 65% of the population each year, regardless of human-caused control operations (USDA 1994). The northwest and southwest regional population of the blackbird group is 139 million of which 27.8 million are starlings (Meanley and Royall 1976). Estimated natural mortality of the blackbird group should be between 69.5 and 90.4 million birds annually. ADC kill in Arizona is therefore no more than about 1.7% of the estimated natural mortality of these populations, and would be expected to be no more than 3% under any future programs. The number of birds killed by the Arizona ADC program amounts to only 0.84% of the regional wintering population. Regionally, ADC's *confirmed kill*, which may be underestimated for the same reasons as identified earlier in this section, averages 750,000 blackbirds and starlings annually, which accounts for only 1% of the natural mortality and only 0.54% of the regional wintering population. Even if ADC's actual regional kill is much higher than the "confirmed" kill, it should be well below normal mortality levels for these populations.

Dolbeer et al. (1995) showed that ADC kills of 3.6% of the wintering population had no effect on breeding populations the following spring. Dolbeer et.al. (1976) constructed a population model which indicated that a reduction of 14.8% of the wintering blackbird population would reduce the spring breeding population by 20% and that a 56.2% reduction in the wintering blackbird population would reduce spring breeding populations by only 33%. Given the density-dependent relationships in a blackbird population (i.e. decreased mortality and increased fecundity of surviving birds) a much higher number would likely have to be killed in order to impact the regional breeding population.

Cumulative impacts would be mortality caused by the Arizona ADC program added to the other known human causes of mortality. Given that the mortality caused by the Arizona ADC program accounts for only 0.84% of the regional blackbird population, and should not exceed 3% of the population in any future year, the proposed control projects implemented under this alternative would have no significant impact on overall breeding populations.

Starlings, being nonindigenous and because of their negative impacts on native bird species (discussed in section 4.1.2.1) , are considered by many wildlife biologists to be an undesirable component of North American ecosystems. Any reduction in starling populations in North America, even to the extent of complete eradication, could therefore be considered a beneficial impact on the human environment because it could allow for recovery of populations of native species.

Feral Domestic Pigeon Population Impacts

The feral domestic pigeon, also known as the rock dove, is an introduced nonnative species in North America. Breeding Bird Survey data indicate the species has been stable to slightly increasing across North America from 1966 through 1994 (Hines et al. 1996). The species is not protected by federal law. Any BDM involving lethal control actions by ADC for this species would be restricted to isolated, individual sites. In those cases where feral domestic pigeons are causing damage or are a nuisance, complete removal of the local population could be achieved. This would be considered to be a beneficial impact on the human environment since it would be requested by the affected property owner or administrator. Although regional population impacts would be minor, even if significant regional or nationwide reductions could be achieved, this would not be considered an adverse impact on the human environment because the species is not part of native ecosystems.

Raven Population Impacts

The common raven is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, North America and extends well into Central America (Goodwin 1986). The Chihuahuan raven occurs in portions of Arizona, New Mexico, Texas and throughout Mexico (Hines et al. 1996). Ravens generally are a resident species but some wandering and local migration occurs with immature and non-breeding birds (Goodwin 1986). Immature birds, which have left their parents, form flocks with non-breeding adults; these flocks tend to roam and are loose-knit and straggling (Goodwin 1986). The raven is an omnivorous species known to feed on carrion, crops, eggs and birds, small mammals, amphibians, reptiles, fish, and insects (Nelson 1934). Larsen and Dietrich (1970) noted that it is generally acknowledged that ravens are responsible for lamb mortality on spring lambing ranges. Ravens also cause damage to nut and fruit orchards and livestock feed in the State.

Ravens are seen year-round by ADC personnel across the State, suggesting they are very common. Knight and Call (1981) summarized a number of studies on common raven territories and home ranges in the west. Nesting territories ranged in size from 3.62 mi^2 to 15.7 mi^2 in Wyoming and Oregon and home ranges varied from 2.53 mi^2 to 3 - 6 mi^2 in Utah and Oregon. Linz et al. (1990) found nest densities of one/1.7 mi^2 in their Camp Pendleton, California study.

Data from the Breeding Bird Survey show a steady increase in breeding numbers of common ravens nationwide between 1966 and 1994. The annual index approximately doubled in that time period. The index for Arizona showed a 7.3% per year average increase over that time period, a 3.5%/year increase from 1966-79, and a 9.3%/year increase from 1980-1994 (Hines et al. 1996). These data clearly indicate that human caused mortality has not resulted in any declines in common raven numbers in either the short or long term in the nation or in the State. Therefore, significant impacts on common ravens are not expected.

The BBS survey indicates the U.S. population of the Chihuahuan raven has experienced a 2.5%/year decline from 1966 through 1994. No trend data were available for Arizona, but New Mexico data indicate a 12%/year increase from 1966-1979 and a 0.6%/year increase from 1980-1994 (Hines et al. 1996). Thus, the trend for the species in the western portion of its range appears to be increasing. Most raven damage situations in the State involve the common raven and not the Chihuahuan raven. Thus, lethal BDM impacts on the latter species are expected to be minor. The two species are easily distinguished from one another by the white area on the back of the neck on the Chihuahuan raven. Should the status of the species change to one of concern, damage situations could be individually evaluated and treated in ways to avoid significant impacts on the Chihuahuan raven population.

4.1.1.2 Alternative 2 - No Federal ADC BDM

Under this alternative, ADC 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 starlings or other target populations would be impacted significantly by implementation of this alternative. DRC-1339 is currently only available for use by ADC employees. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of other chemical toxicants which could lead to unknown impacts on target bird populations.

4.1.1.3 Alternative 3 - Technical Assistance Only

Under this alternative, ADC would have no impact on target species populations directly. Private efforts to reduce or prevent damage and perceived disease transmission risks could increase which could result in impacts on those populations. For the same reasons shown in the population impacts analysis in section 4.1.1.1, it is unlikely that starling or other target populations would be impacted significantly by implementation of this alternative. 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 - Nonlethal Required Before Lethal

Under this alternative, ADC take of target species would probably be less than that of the proposed action because lethal actions by ADC would be restricted to situations in which nonlethal controls have been tried, in most cases by the requestor but also by ADC, without success. No preventive lethal control actions would be taken by ADC. For many individual damage situations, this alternative would be similar to the current program because many producers have tried one or more nonlethal methods such as propane exploders and pyrotechnics without success or have considered them and found them to be impractical in their particular situations prior to requesting ADC assistance. Without ADC conducting BDM activities, it is likely that private BDM efforts would increase, leading to potentially similar or even greater cumulative impacts than those of the proposed action. For the same reasons shown in the population impacts analysis in section 4.1.1.1, it is unlikely that statewide target species populations would be impacted significantly by implementation of this alternative. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be greater than the proposed action, but less than those under Alternatives 2 and 3.

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 Proposed Action)

No nontarget birds are known to have been taken during BDM operations as described in the proposed action in the last 3 years. However one *suspected* incident of nontarget take occurred in November, 1992, when 41 dead mourning doves (*Zenaidura macroura*) were retrieved near a dairy which had been treated with DRC-1339 to alleviate a starling problem. Independent investigations by the AGFD and the ADA were never able to determine a cause of death. No EPA/FIFRA label violations or Migratory Bird Treaty Act violations were documented.

While every precaution (See 3.4) is taken to safeguard against taking nontarget 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.

Inter-specific nest competition has been well documented in starlings. Miller (1975) and Barnes (1991) reported starlings were responsible for a severe depletion of the eastern bluebird (*Sialis sialis*) population due to nest competition. Nest competition by starlings has also been known to adversely impact sparrow hawks (American kestrell (*Falco sparverius*) (Nickell 1967; Von Jarchow 1943; Wilmers 1987), red-bellied woodpeckers (*Centurus carolinus*), Gila woodpeckers (*Centurus uropygialis*) (Ingold 1994; Kerpez et.al. 1990), and wood ducks (*Aix sponsa*) (Shake 1967;

Heusmann et.al. 1977; Grabill 1977; McGilvery et.al 1971). Weitzel (1988) reported 9 native species of birds in Nevada had been displaced by starling nest competition, and Mason et al. (1972) reported starlings evicting bats from nest holes. Control operations as proposed in this alternative would reduce starling populations, although probably not significantly. Reduction in nest site competition would be a beneficial impact on the species listed above. Although such reductions are not likely to be significant, the benefits would probably outweigh any adverse impacts due to nontarget take.

In a 1992 Biological Opinion, the U.S. Fish & Wildlife Service concluded that DRC-1339 may adversely affect the Aleutian Canada Goose (*Branta canadensis leucopareia*) and the Whooping Crane. Neither of these species has ever been reported in any feedlot or dairy in Arizona. Mitigation measures to avoid T&E impacts as well as the inherent safety features of DRC-1339 that preclude hazards to mammals and plants were described in Chapter 3 (section 3.4.2.2) and are also described in section 4.1.4.1 of this chapter. Those measures 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 - No Federal ADC Bird Damage Management

Alternative 2 would not allow any ADC BDM in the State. There would be no impact on nontarget or T&E species by ADC BDM activities from this alternative. However, private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. Hazards to raptors, including bald eagles and peregrine falcons, could therefore be greater under this alternative. 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 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.

4.1.2.3 Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any ADC direct operational BDM in the area. There would be no impact on nontarget or T&E species by ADC activities from this alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could result in less experienced persons implementing control methods leading to greater take of nontarget wildlife. Hazards to raptors, including bald eagles and peregrine falcons, could therefore be greater under this alternative. It is hypothetically possible that, similar to 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 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.

4.1.2.4 Alternative 4 - Nonlethal Required Before Lethal

Under this alternative, ADC take of nontarget animals would probably be less than that of the proposed action because no preventive lethal control actions would be taken by ADC. Mitigation

measures to avoid T&E impacts were described in Chapter 3. Those measures should assure that adverse impacts are not likely to occur to T&E species from ADC's activities if Alternative 4 was implemented. However, if producers were not satisfied by corrective control only operations by ADC, private efforts to reduce or prevent depredations could increase. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. Hazards to raptors, including bald eagles and peregrine falcons, could therefore be greater under this alternative. It is hypothetically possible that, similar to Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could further lead to unknown impacts on local nontarget species populations, including T&E species. Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.3 Safety and Efficacy of Chemical Control Methods

4.1.3.1 Alternative 1 -Continue the Current Program (Proposed Action)

DRC-1339 is the primary lethal chemical BDM method that would be used under the current program alternative. 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. Nontarget hazards are low due to the low degree of sensitivity most other bird species have for this chemical. The compound acts in a humane manner producing a quiet and painless death. The compound is unstable in the environment and degrades rapidly when exposed to sunlight and heat. DRC-1339 is highly soluble in water but does not hydrolyze. Photo degradation occurs rapidly in water. The compound is tightly bound to soil and has low mobility. The half life is about 25 hours and identified metabolites have low toxicity. Secondary hazards of DRC-1339 are almost nonexistent. For example, studies have been conducted in which blackbirds killed with DRC-1339 were fed to raptors and scavenger mammals for 30 to 200 days, and no ill effects were noted (USDA 1995). This can be attributed to relatively low toxicity to species that might scavenge on blackbirds and starlings killed by this chemical and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. This means there is virtually no hazard to pet dogs and cats or other animals that might pick up and eat birds killed by this chemical.

Other nonlethal BDM chemicals that might be used or recommended by ADC if they become registered would be repellents such as methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption) which is currently being investigated as a livestock feed additive. 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.

4.1.3.2 Alternative 2 - No Federal ADC BDM:

Under this alternative, no legal usage of chemicals would occur. 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, falcons, and scavenging mammals, including pet dogs and cats, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

4.1.3.3 Alternative 3 - Technical Assistance Only.

Impacts under this alternative would be similar to those described in Alternative 2.

4.1.3.4 Alternative 4 - Nonlethal Required Before Lethal.

Impacts under this alternative would be similar to those described in Alternative 2, but to a lesser degree.

4.1.4 Does the value of livestock feed saved equal or exceed the cost of providing BDM service at cattle feeding facilities?

4.1.4.1 Alternative 1 -Continue the Current Program (Proposed Action)

Appendix B contains an analysis of the value of livestock feed saved on cooperating cattle feeding facilities by the current program. The analysis was intended to be conservative and indicates that approximately $120,000 worth of feed was saved on the facilities provided BDM service in FY 1995. The Arizona ADC program and cooperating feedlots and dairies spent $40,481 to control bird damage during FY 1995. Therefore, it appears that the value of feed saved exceeds the cost of BDM without considering other benefits such as prevention of disease transmission, restored weight gain performance, and milk yields.

4.1.4.2 Alternative 2 - No Federal ADC BDM.

Under this alternative ADC would not assist in resolving bird damage problems. Current and potential cooperating facilities would have to withstand losses and the risk of disease problems or resort to their own BDM. Their costs for conducting their own BDM would depend on the methods chosen. Nonlethal methods such as exclusionary fencing and overhead barriers would most likely cost in the hundreds of thousands of dollars per facility to install and maintain and could cause additional costs in the form of reduced efficiency. If Illegal pesticide use occurred, it might be less expensive if it was not detected by enforcement agencies, or much more expensive if the use was detected and penalties were imposed.

4.1.4.3 Alternative 3 - Technical Assistance Only.

Under this alternative, ADC would only provide advice to livestock feeding facilities and others with bird damage problems. Since DRC-1339 is only registered for use by ADC personnel, such facilities would not have it as a legal option and ADC could not recommend its use. Facility operators' costs for conducting their own BDM would depend on the methods chosen. The impacts would likely be similar to Alternative 2.

4.1.4.4 Alternative 4 - Nonlethal Required Before Lethal

Under this alternative, livestock feeding facilities would not receive operational lethal BDM assistance from ADC until they have tried one or more nonlethal methods and failed. This alternative would result in about the same costs vs. avoided losses as the current program for some operations who have already tried nonlethal methods. For others who determined that no nonlethal methods were suitable or practical for their situations, the cost impacts would likely be similar to Alternatives 2 and 3.

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APPENDIX A

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APPENDIX B

AN ANALYSIS OF BIRD DAMAGE AT COOPERATING FEEDLOTS AND DAIRIES IN ARIZONA

Table B-1 shows bird numbers estimated at all facilities to which ADC provided BDM services in Arizona during FY 95. Estimates by ADC personnel of blackbirds and starlings feeding at individual feedlots ranged from 3,000 to 50,000, and averaged 20,500 for individual estimates. The majority of these birds are wintering migrants. This is supported by the fact that damage problems do not begin until November each season and end around the first of March. The cumulative total number of birds observed over the entire season was more than 1.5 million.

Table B-1. Estimates of the number of blackbirds and starlings feeding at cooperating livestock feedlots and dairies throughout the 1994-95 winter migrant period in Arizona. From 6 to 10 observations were made at each facility during the season. Periodic observations were made beginning in November 1994 and ending in February 1995. Intervals (number of days) between observations on each facility were variable.

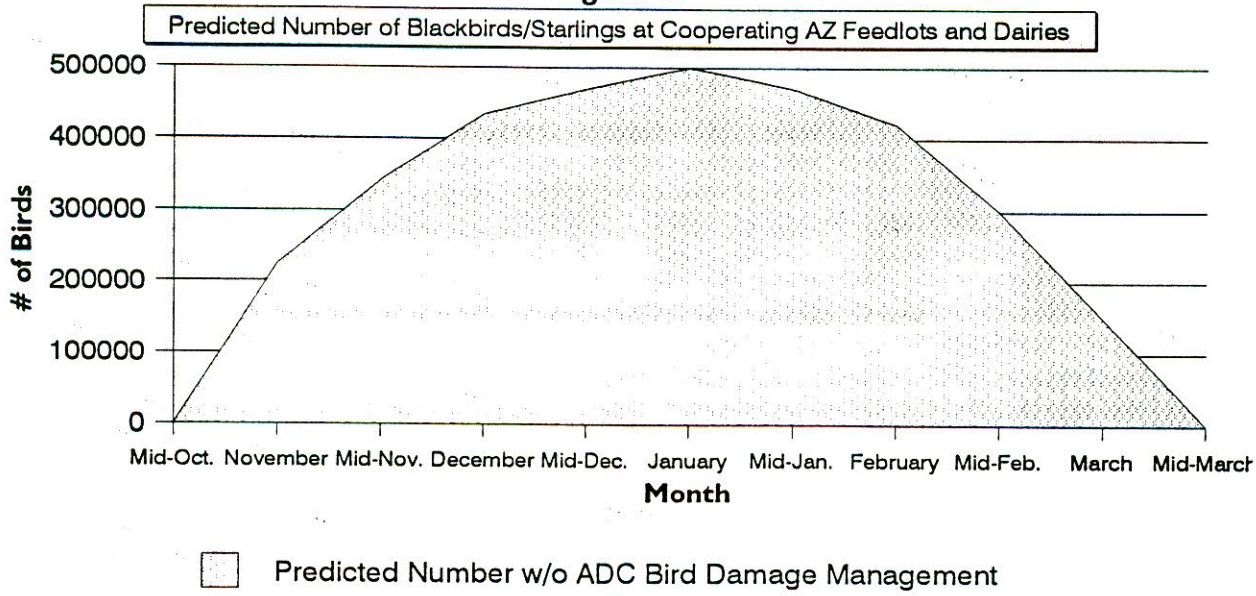
	Observations											
Feed-lot or Dairy ↕	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	Total # Birds	Average # Birds
A	35,000	20,000	15,000	25,000	25,000	25,000	20,000	35,000	20,000	8,000	228,000	22,800
B	30,000	25,000	20,000	30,000	40,000	45,000	40,000	40,000	35,000	30,000	335,000	33,500
C	30,000	20,000	20,000	40,000	15,000	10,000	20,000	15,000			170,000	21,250
D	15,000	10,000	5,000	5,000	5,000	5,000	5,000				50,000	7,143
E	35,000	20,000	30,000	25,000	25,000	20,000					155,000	25,833
F	10,000	5,000	15,000	15,000	5,000	5,000	3,000				58,000	8,286
G	15,000	10,000	10,000	15,000	15,000	20,000					85,000	14,167
H	25,000	10,000	25,000	30,000	10,000	10,000	15,000				125,000	17,857
I	20,000	15,000	30,000	25,000	10,000	10,000	15,000				125,000	17,857
J	50,000	30,000	35,000	45,000	20,000	5,000					185,000	30,833
Total	265,001	165,002	205,003	255,004	170,005	155,006	118,007	90,008	55,009	38,010	1,516,055	199,526

Each estimate was made the day prior to applying DRC-1339 treated bait to kill depredating birds. Most of the birds die some distance from the treated area within 24-48 hours making actual mortality difficult to determine. However, these bait applications were believed to be effective in killing most of the blackbirds and starlings feeding at the facilities at the time, because the facility operators reported few birds returning following treatment. Bird numbers generally build back up during the interval between treatments. Thus, the actual numbers of birds that would have fed at the facilities probably would have been higher to some unknown degree than that shown by Table A-1 if ADC had not conducted lethal control.

It is reasonable to predict that, without lethal damage management using DRC-1339, bird numbers would accumulate to some degree at each facility during the wintering period. The peak number of birds using

all facilities combined would be somewhere between the 200,000 average combined total and the 1.5 million cumulative combined total shown in Table A-1. Bailey (1966) studied the seasonal abundance of starlings at feedlots in Utah and showed that starling numbers doubled at feed lots between November and January. Therefore, it is reasonable to conclude that starling and blackbird numbers at cooperating

Figure 1.



facilities probably double between the time of first observations and mid-season. This suggests the total number of such birds at all cooperating facilities exceed 520,000 by January. We believe an approximate depiction of the seasonal relationship between cumulative numbers of blackbirds/starlings at cooperating feedlots/dairies in the State through the wintering period is as shown in Figure 1. We estimate the wintering period for migrant blackbirds and starlings to be about 150 days. Using the assumed total bird numbers represented by the graph in Figure 1, we estimate that the *average* number of birds per day at all cooperating feedlots and dairies combined over the course of the wintering period would have been about 300,000[2] in FY-1995 in the absence of lethal BDM.

Besser et al. (1968) calculated starlings and redwing blackbirds cost feedlot operators $84 and $2, respectively, per 1000 birds based on observations of feeding habits of banded and color-marked birds at 12 feedlots in Colorado. The differences between the two species were because starlings consumed a greater quantity of feed per bird and selected more expensive components of the feed rations than did redwings. The cost of the feed consumed by the two species was reported to be $0.03/lb. for starlings and $0.015/lb. for redwings in 1967. Feed costs for operators in Arizona in 1995 averaged about $150 per ton or $0.075/lb. Assuming redwings do not feed selectively when consuming livestock feed, then the value per pound consumed by redwings in 1995 would be the average cost per pound of feed, or $0.075. Assuming starlings consume feed ration components that are twice as expensive as the average cost per pound of feed (as indicated by the Besser study), the value per pound consumed by starlings in 1995 was $0.15.

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[2]This number was calculated by averaging the approximate numbers of birds shown at each month and mid-month point in Figure 1.

The Besser et al. study reported that (1) starlings and redwings obtained 50% and 10%, respectively, of the feed they consumed from feed troughs (the rest of the birds' feed consumption is assumed to have been spilled grain which would otherwise not be used by livestock anyway), (2) starlings and redwings spent 50% and 30%, respectively, of the days during winter at the feedlots, and (3) consumption capacities per bird per day were 28.3 g (0.0625 lb.) for starlings and 11.1 g (0.0245 lb.) for redwings. ADC observations at feedlots in Arizona are only of birds that are actually at the feedlots and feeding on a given day. The average of the 6-10 estimates on each feedlot throughout the season (Table A-1) is therefore representative of the average daily bird use of each feedlot for the whole season. Thus for purposes of calculating consumption at the feedlots in Arizona, we assume 100% of the observed bird-days of use represent feeding and not the 50% and 30%, respectively, that the Besser study reported. The average percent starlings among the birds observed at some feedlots and dairies throughout the winter in Arizona is estimated to be about 75%.

The value of cattle rations consumed by an average of 300,000 starlings and blackbirds over a 150 day wintering season in 1994-95 would therefore be:

Starlings:

.75(prop. of birds that were starlings) x 300,000 x 150 days x .5(prop. of feed from troughs) x 0.0625lb./bird/day x $0.15/lb. = $158,200

Redwings/other blackbirds:

.25(prop. of birds that were blackbirds) x 300,000 x 150 days x .1(prop. of feed from troughs) x 0.0245lb./bird/day x $0.075/lb. = $2,067

Thus the total estimated value of feed lost would have been about $160,000 on cooperating feedlots and dairies in FY 95 without ADC BDM services. Other potential indirect causes of damage by blackbirds such as the transmission of diseases that can reduce weight gains are theoretically significant and must also be considered in any decision concerning the need for BDM at a cattle feeding facility.

Estimating Feed Losses Avoided Because of ADC BDM Services.

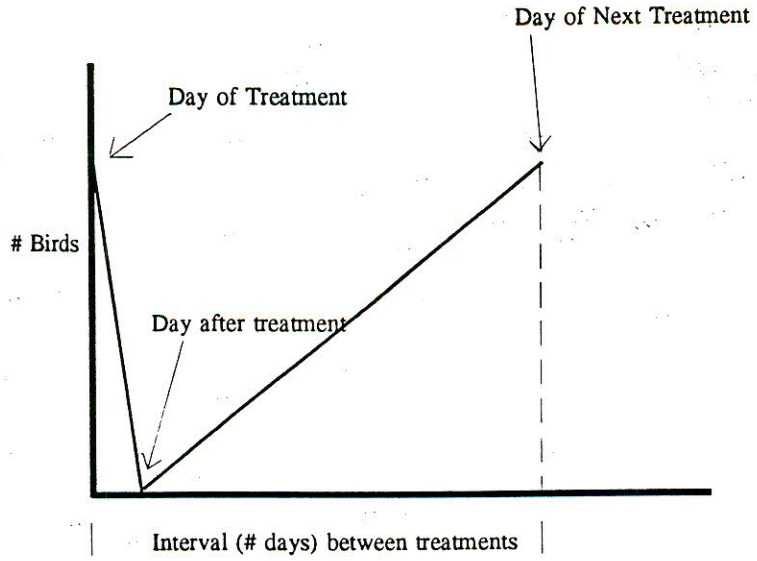
As stated previously, bird numbers generally build back up to various degrees at each cattle feeding facility during the interval between DRC-1339 treatments. This means that bird use, in terms of blackbird-starling-days (BBS-days), fluctuates considerably throughout the season and complicates efforts to estimate the feed loss that still occurs despite lethal BDM by ADC.

Research studies and field observations suggest DRC-1339 treatments at cattle feeding operations generally produce 75% mortality (Glahn 1982). However, observations at cooperating feedlots in Arizona suggest few birds return the day after treatment. Thus, if 75% mortality is being achieved by such treatments, then surviving birds do not generally return for awhile after treatment.

In general, the approximate relationship between bird numbers and time between treatments on a given feedlot is shown in Figure 2. The number of BBS-days of bird use at a facility that occur from one treatment to the next despite ADC BDM services being provided is equal to the area under the solid line in Figure 2. This type of estimate assumes that, following each treatment, bird numbers build back up at a steady linear rate until the next treatment. Although this assumption is probably not accurate for many individual treatment intervals, it is probably accurate *on the average* and is therefore reasonable.

To determine total number of BBS-days with ADC service for all cooperating cattle feeding facilities combined, the total of all areas under the solid line as shown by the example in Figure 2 was determined

Figure 2



for all treatment intervals for all 10 facilities in FY 95. That total was 12,085,005. Total estimated BBS-days without ADC BDM services would be 300,000 x 150 days or 45 million. Thus, the estimated BBS-days of bird use avoided at cooperating facilities because of ADC BDM services was 33 million (the difference between 45 million and 12 million).

The value of avoided feed losses due to each avoided BBS-day is estimated by the following calculations:

Starlings:

.75(prop. of flocks that were starlings) x 33,000,000 x .5(prop. of feed from troughs) x 0.0625lb./bird/day x $0.15/lb. = $116,016

Redwings and other blackbirds:

.25(prop. of flocks that were blackbirds) x 33,000,000 x .1(prop. of feed from troughs) x 0.0245lb./bird/day x $0.075/lb. = $1,516

Thus, total estimated value of feed loss avoided because of ADC BDM services was about $120,000 in FY 95.

Cost of Providing ADC BDM Services at Arizona Cattle Feeding Operations

The Arizona ADC program and cooperating feedlots and dairies spent $40,481 to control bird damage during FY-1995. Therefore, it appears that the value of feed saved exceeds the cost of BDM by a factor of 3 to 1, without considering other benefits such as prevention of disease transmission, restored weight gain performance, and milk yields.