ENVIRONMENTAL ASSESSMENT

Reducing Gull Damage
Through an
Integrated Wildlife Damage Management Program
in the State of Rhode Island

Prepared By:

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ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

In Cooperation with:

UNITED STATES FISH AND WILDLIFE SERVICE

April 2008

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ACRONYMS

AC	Alpha-Chloralose
ADC	Animal Damage Control
APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
BCR	Bird Conservation Regions
BO	Biological Opinion
CBC	Christmas Bird Count
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FEIS	Final Environmental Impact Statement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FY	Fiscal Year
GDM	Gull Damage Management
INAD	Investigational New Animal Drug
IWDM	Integrated Wildlife Damage Management
MA	Methyl anthranilate
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOU	Memorandum of Understanding
NAS	National Audubon Society
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWRC	National Wildlife Research Center
OSHA	Occupational Safety and Health Administration
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RPA	Reasonable and Prudent Alternatives
RPM	Reasonable and Prudent Measures
SOP	Standard Operating Procedure
T&E	Threatened and Endangered
URICE	University of Rhode Island Cooperative Extension Service
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
WS	Wildlife Services

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

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 INTRODUCTION

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) program is authorized by Congress to manage a program to reduce human/wildlife conflicts. WS is authorized to protect resources from wildlife damage through the Act of March 2, 1931 (46 Stat. 1468; 7 USC 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 USC 426c). WS' mission is to "provide federal leadership in wildlife damage control to protect America's agricultural, industrial and natural resources, and to safeguard public health and safety (USDA 1989)." This is accomplished through:

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

This Environmental Assessment (EA) evaluates ways by which this responsibility can be carried out to resolve conflicts with herring gulls (*Larus argentatus*), ring-billed gulls (*Larus delawarensis*), great black-backed gulls (*Larus marinus*), and laughing gulls (*Larus atricilla*) in the State of Rhode Island.

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

1.1 PURPOSE

Normally, individual wildlife damage management actions conducted by the WS program could be categorically excluded from further National Environmental Policy Act (NEPA) analysis, in accordance with APHIS implementing regulations for NEPA (7 CFR 372.5(c), 60 Fed. Reg. 6,000, 6,003, (1995)). WS is preparing this EA to: 1) facilitate planning, interagency coordination and the streamlining of program management; 2) clearly communicate to the public the analysis of individual and cumulative impacts of program activities; and 3) evaluate and determine if there are any potentially significant or cumulative adverse affects from the proposed program. All gull damage management activities in Rhode Island are undertaken in compliance with relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA) of 1973, as amended (16 USC 1531-1543), and the Migratory Bird Treaty Act (MBTA), as amended (16 USC 703 et seq.). This analysis relies on existing data contained in published documents (Appendix A), WS' Management Information System, and WS' Final Environmental Impact Statement (FEIS)[1] (USDA 1997); information from WS' FEIS is incorporated by reference. WS' FEIS contains a detailed discussion of potential environmental impacts of methods available to manage gull damage in Rhode Island.

The purpose of this EA is to analyze the effects of WS' activities in Rhode Island to manage damage caused by herring gulls, ring-billed gulls, great black-backed gull, and laughing gulls. Resources protected by such activities include human health and safety, property, agriculture, threatened and endangered species, other wildlife, and natural resources.

[1] WS' FEIS may be obtained by contacting USDA/APHIS/WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

1.2 NEED FOR ACTION

1.2.1 Summary of Proposed Action

The proposed action is to continue the current portion of the Rhode Island WS program that responds to requests for gull damage management to protect human health and safety, property, agriculture, threatened and endangered species, other wildlife, natural resources, and aquaculture. A major component the Rhode Island WS program is the goal of minimizing human health and safety threats and property damage in urban environments. An Integrated Wildlife Damage Management (IWDM) approach would be recommended and implemented to allow the use of any legal lethal or non-lethal technique or method, used singly or in combination, to meet the request or needs for resolving wildlife conflicts. See Appendix B for a description of the gull damage management (GDM) methods that are available for use or recommendation by WS. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification, or harassment would be recommended and utilized to reduce damage. Lethal methods used or recommended by WS could include shooting, trapping, egg addling/destruction, nest destruction, or euthanasia following live capture by trapping. Non-lethal methods used or recommended by WS could include chemical repellants, porcupine wires, wire barriers, netting; and harassment with pyrotechnics, lasers, lights, vehicles, and audio and visual repellents. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could be a combination of non-lethal and lethal methods, or there could be instances where the application of lethal methods alone would be the most appropriate strategy. Wildlife damage management activities would be conducted in the State, when requested and funded, on private or public property, including airport facilities and adjacent or nearby properties, after a Cooperative Service Agreement or other comparable document has been completed. All management activities would comply with appropriate federal, state, and local laws.

1.2.2 Need for GDM to Protect Human Health and Safety

1.2.2.1 Disease Transmission

Research has shown that gulls carry various species of bacteria such as *Bacillus* spp., *Clostridium* spp., *Campylobacter* spp., *Escherichia coli*, *Listeria* spp., and *Salmonella* spp. (MacDonald and Brown 1974, Fenlon 1981, Butterfield et al. 1983, Monaghan et al. 1985, Norton 1986, Vauk-Hentzelt et al. 1987, Quessey and Messier 1992). Transmission of bacteria from gulls to humans is difficult to document, however, Reilley et al. (1981) and Monaghan et al. (1985) both suggested that gulls were the source of contamination for cases of human salmonellosis. Concentrations of gulls at municipal water supply sources and waste water and sewage treatment facilities may also contribute to disease transmission (Jones et al. 1978, Hatch 1996). WS also monitors gull species for avian influenza.

Public health concerns often arise when gulls feed and loaf near fast food restaurants, and picnic facilities; deposit waste from landfills in urban areas; and contaminate industrial facility ventilation systems with feathers, nesting debris, and droppings. Gulls feeding around vegetable crops and on livestock feed can potentially aid in the transmission of salmonella.

Many times, individuals or property owners that request assistance with nuisance gull problems are concerned about potential disease risks but are unaware of the types of diseases that can be associated with these birds. In most situations, GDM is requested because the mess associated with droppings left by concentrations of birds is aesthetically displeasing and can result in recurrent clean-up costs. Under the proposed action, WS could agree to assist in resolving these types of problems.

1.2.2.2 Airport Safety

It is widely recognized throughout the civil and military aviation communities that the threat to human health and safety from aircraft collisions with wildlife is increasing (Dolbeer 2000). Collisions between aircraft and wildlife are a concern throughout the world because they threaten passenger safety (Thorpe 1996), result in lost revenue and costly repairs to aircraft (Linnell et al. 1996, Robinson 1996), and can erode public confidence in the air transport industry as a whole (Conover et al. 1995).

In several instances, wildlife-aircraft collisions in the United States have resulted in human fatalities, the most recent of which occurred in 1995 when an Air Force E-3B AWACS aircraft collided with a flock of Canada geese on Elmendorf Air Force Base, Alaska, killing all 24 passengers and crew. In addition, a $190 million plane was lost (Dolbeer 1997). 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 European starlings (Terres 1980). In 2000, a Boeing 747 ingested a western gull on take-off from Los Angeles International Airport. Parts of the engine fell onto a beach and the pilot dumped 83 tons of fuel into the ocean before making an emergency landing. The cost of repairs to the plane was $400,000 (Cleary et al. 2002a).

Cleary et al. (2002b) reported that gulls were the most commonly struck bird group from 1990-2001. Gulls pose a serious threat to aviation safety in Rhode Island (USDA 1994, Cleary et al. 2002b). From 1990 to 2007, the Federal Aviation Administration (FAA) National Wildlife Strike Database reported 74 gull strikes throughout the State of Rhode Island (FAA 2007).

1.2.2.3 Landfills

Gull attraction to landfills as a food source has been well documented (Mudge and Ferns 1982, Patton 1988, Belant et al. 1995a, Belant et al. 1998, Gabrey 1997). Large numbers of gulls are attracted to and use landfills as feeding and loafing areas throughout North America. In the northeastern United States, landfills often serve as foraging and loafing areas for gulls throughout the year, while attracting larger populations of gulls during migration periods (Bruleigh 1998). Landfills have even been suggested as contributing to the increase in gull populations (Verbeek 1977, Patton 1988, Belant and Dolbeer 1993). Federal (40 CFR 258.22) and state (Title 23 Chapter 23-19.13-1) regulations mandate that landfills prevent or control potential vectors, such as gulls. Gulls that visit landfills may loaf and nest on nearby rooftops, causing health concerns, aesthetic distractions and structural damage to buildings and equipment.

Bird conflicts associated with landfills include accumulation of feces on equipment and buildings, distraction of heavy machinery operators, and the potential for birds to transmit disease to workers on site. The tendency for gulls to carry waste off site results in accumulation of feces and deposition of garbage on surrounding industrial and residential areas creates a nuisance, as well as generates the potential for birds to transmit disease to neighboring residents or to livestock through contamination of feed.

WS often receives requests for assistance from landfill operators to disperse gulls that create damage or are a nuisance for property or people. Under the proposed action, WS could agree to assist in resolving these types of problems.

1.2.3 Need for GDM to Protect Property

Birds frequently damage structures on private property, or public facilities, with fecal contamination. Accumulated bird droppings can reduce the functional life of some building roofs by 50% (Weber 1979). Corrosion damage to metal structures and painted finishes, including those on automobiles, can occur because of uric acid from bird droppings. Roof-top colonies of nesting gulls have been well documented and frequently cause damage to urban structures. Gulls transport large amounts of nest material and food

remains to the roof-tops which can obstruct roof drainage systems and lead to structural damage to buildings (Vermeer et al. 1988, Blokpoel and Scharf 1991a, Belant 1993).

Since federal fiscal year (FY)[2] 1999, WS has responded to 110 requests for assistance related to gulls in Rhode Island. WS often receives requests for assistance to help reduce damage caused by nesting gull colonies. Under the proposed action, WS could agree to assist in resolving these types of problems.

1.2.4 Need for GDM to Protect Agriculture

The State of Rhode Island reported an estimated 850 farms in 2007 (National Agricultural Statistical Service 2007a). Cash receipts from agricultural commodities in Rhode Island for 2007 totaled nearly $66 million (National Agricultural Statistical Service 2007b).

Gulls, especially ring-billed gulls, cause damage by feeding around and defecating on vegetable crops. Gulls consume and contaminate bakery waste used as feed at some dairies and cattle and hog feed lots. Gulls also contaminate silage, corn and other livestock feed with droppings at dairies and livestock feed lots. Williams et al. (1977) and Johnston et al. (1979) reported that gulls can transmit salmonella to livestock through droppings and contaminated drinking water.

1.2.5 Need for GDM to Protect Wildlife and Native Vegetation, Including T&E Species

Some of the species listed as threatened or endangered under the Endangered Species Act of 1973 are preyed upon or otherwise adversely affected by certain bird species. Concentrations of gulls often impact the productivity and survivorship of rare or endangered colonial species such as terns (USDI 1996) and prey upon the chicks of colonial waterbirds. Some examples of WS' assistance with protecting endangered species include protection of piping plover nests from gulls in New Jersey (J. Bucknall, WS, pers. comm. 2007), protection of nesting least terns and piping plovers in Massachusetts from predation by gulls and American crows, (T. Cozine, WS, pers. comm. 2008), protection of nesting common and roseate terns from black-crowned night heron and gull predation in Connecticut (T. Cozine, WS, pers. comm. 2008).

1.2.6 Need for GDM to Protect Aquaculture and Fishery Resources

Aquaculture, the cultivation of finfish and invertebrates in captivity, has grown exponentially in the past several decades (Price and Nickum 1995). Gulls can feed on fish being raised at Rhode Island fish hatcheries as well as commercial hatcheries or aquaculture facilities. In Rhode Island, there are four trout hatcheries operated by the Rhode Island Department of Environmental Management (RIDEM), Division of Fish and Wildlife. Providence College lists nine commercial aquaculture facilities in Rhode Island and 6 facilities in the start up phase.

It is possible that gulls function as vectors for the spread of disease at aquaculture facilities. The threat of disease transmission, such as Whirling Disease, through gulls is unknown at this time, but there remains a need to protect fishery resources from this possibility (Phil Hulbert, NYSDEC, Pers. Comm. 2003).

WS has not received requests for assistance to help reduce damage caused by gull activity at aquaculature facilities but it is reasonable to anticipate requests for assistance based on the increasing number of aquaculture facilities in the State. Under the proposed action, WS could agree to assist in resolving these types of problems.

1.3 WS' RECORD KEEPING REGARDING REQUESTS FOR GULL-RELATED BIRD DAMAGE MANAGEMENT ASSISTANCE

WS maintains a Management Information System (MIS) database to document assistance that the agency provides in addressing wildlife damage conflicts. MIS data is limited to information that is collected from people who have requested services or information from WS. It does not include requests received or

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

responded to by local, state, or other federal agencies, and it is not a complete database for all wildlife damage occurrences. The number of requests for assistance does not necessarily reflect the extent of need for action, but this data does provide an indication that needs exists.

The database includes, but is not limited to, the following information: species of wildlife involved, the number of individuals involved in a damage situation; tools and methods used or recommended to alleviate the conflict; and the resource that is in need of protection. Table 1-1 provides a summary of direct control and technical assistance projects completed by the WS program in Rhode Island for FY 1999 - 2007. A description of WS' direct control and technical assistance programs are described in Chapter 3 of this EA.

Table 1-1. Number of direct control and technical assistance incidents by resource conducted by WS in Rhode Island from FY 1999 through FY 2007 involving gull species.

Fiscal Year	Agriculture	Property	Human Safety	Natural Resources
1999	0	5	9	0
2000	0	6	4	0
2001	0	8	7	0
2002	0	16	2	0
2003	0	14	2	5
2004	0	10	8	3
2005	0	14	3	0
2006	0	16	2	0
2007	0	21	2	0
Total	**0**	**110**	**39**	**8**

1.4 RELATIONSHIP OF THIS EA TO OTHER ENVIRONMENTAL DOCUMENTS

WS' Programmatic Environmental Impact Statement - WS has developed a programmatic FEIS that analyzes and addresses potential environmental impacts from programmatic activities and various wildlife damage management methods employed by WS (USDA 1997). 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 GDM as currently implemented by the Rhode Island WS program be continued in the State?
- If not, how should gull damage in the State be managed and what role should WS play in this?
- Might the continuing of WS' current program of GDM have significant effects requiring preparation of an Environmental Impact Statement (EIS)?

1.6 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

1.6.1 Actions Analyzed

This EA evaluates ring-billed gull, herring gull, great black-backed gull, and laughing gull damage management by WS to protect human health and safety, property, agriculture, threatened and endangered species, other wildlife, and natural resources on private and public land or facilities within the State

wherever such management is requested from the WS program.

1.6.2 Period for which this EA is Valid

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

1.6.3 Native American Tribes and Land

Currently, WS does not have a Memorandum of Underating (MOU) or other agreement with with any Native American tribes. If WS enters into an agreement with a tribe for GDM, this EA would be reviewed and supplemented if appropriate to insure compliance with NEPA. MOUs, agreements, and NEPA compliance would be conducted as appropriate before conducting GDM on tribal lands.

1.6.4 Site Specificity

This EA analyzes potential effects of WS' GDM activities that will occur or could occur at private and public property sites or facilities within any of the five Rhode Island counties. Because the proposed action is to continue the current program, and because the current program's goal and responsibility are to provide service when requested within the constraints of available funding and personnel, it is conceivable that GDM activity by WS could occur anywhere in the State. Thus, this EA analyzes the potential effects of such efforts wherever and whenever they might occur as part of the current program. The EA emphasizes important issues as they relate to specific areas whenever possible. This EA emphasizes major issues as they relate to specific areas whenever possible, however, many issues apply wherever gull damage and resulting management occurs, and are treated as such. WS' Decision Model based on Slate et al. (1992) and WS Directive 2.105 would be the routine thought process for each site-specific procedure to determine the methods and strategies to use or recommend for individual actions conducted by WS in the State (See USDA 1997 and Chapter 2 for a more complete description of the WS Decision Model and examples of its application). Decisions made using this thought process will be in accordance with any mitigation measures and standard operating procedures described herein and adopted or established as part of the decision.

1.6.5 Summary of Public Involvement

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

1.7 AUTHORITY AND COMPLIANCE

1.7.1 Authority of Federal and State Agencies in Migratory Bird Damage Management in Rhode Island[3]

Wildlife Services Legislative Authority - The primary statutory authorities for the WS program are the Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c).

U.S. Fish and Wildlife Service (USFWS) - The USFWS is responsible for managing and regulating the

[3] See Chapter 1 of USDA (1994) and WS' programmatic FEIS (USDA 1997) for a complete discussion of Federal laws pertaining to WS.

take of bird species that are listed as migratory under the Migratory Bird Treaty Act (MBTA) and those that are listed as threatened or endangered under the Endangered Species Act (ESA).

Rhode Island Department of Environmental Management, Division of Fish and Wildlife - Rhode Island's Division of Fish and Wildlife is responsible for balancing the needs of people and wildlife, administering fish and wildlife laws, carrying out sound fish and wildlife management practices, and conducting fish and wildlife research and managing the State's marine and coastal resources.

The Rhode Island Department of Environmental Management, Division of Agriculture—Pesticide Unit - The Pesticide Unit, in the Division of Agriculture, carries out the day to day responsibilities of regulating pesticides in the State of Rhode Island.

Memoranda of Understanding Between Various Agencies and WS in Rhode Island - WS in Rhode Island has a MOU with RIDEM, University of Rhode Island Cooperative Extension Service (URICE), and Rhode Island Department of Health (RIDOH). These MOUs were established to develop a cooperative relationship for planning, coordinating, and implementing wildlife damage management policies and to facilitate exchange of information.

1.7.2 Compliance with Other Federal Laws

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

National Environmental Policy Act - WS analyzes the environmental effects of program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in Rhode Island. When WS' operational assistance is requested by another federal agency, NEPA compliance is the responsibility of the other federal agency. However, WS could agree to complete NEPA documentation at the request of the other federal agency.

Endangered Species Act (ESA) - It is federal policy, under the ESA, that all federal agencies seek to conserve threatened and endangered (T&E) species and shall utilize their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with the U.S. Fish & Wildlife Service (USFWS) to use the expertise of the USFWS to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). WS obtained a Biological Opinion (BO) from USFWS in 1992 describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997).

Migratory Bird Treaty Act of 1918 (16 U.S.C. 03-711; 40 Stat. 755), as Amended - The MBTA provides the USFWS regulatory authority to protect families of birds that contain species which migrate outside the United States. The law prohibits any "*take*" of these species by any entities, except as permitted by the USFWS; therefore, the USFWS issues permits to requesters for reducing migratory bird damage.

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

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

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.

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

The Native American Graves and Repatriation Act of 1990 - The Native American Graves Protection and Repatriation Act require federal agencies to notify the Secretary of the Department that manages the federal lands upon the discovery of Native American cultural items on federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

National Historic Preservation Act (NHPA) of 1966 as amended - The NHPA of 1966, and its implementing regulations (36 CFR 800), requires federal agencies to: 1) determine whether activities they propose constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources, and 3) consult with appropriate American Indian Tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. WS activities as described under the proposed action do not cause ground disturbances nor do they otherwise have the potential to significantly affect visual, audible, or atmospheric elements of historic properties and are thus not undertakings as defined by the NHPA. WS has determined GDM actions are not undertakings as defined by the NHPA because such actions do not have the potential to result in changes in the character or use of historic properties. A copy of this EA is being provided to Indian tribes in the State to allow them the opportunity to express any concerns that might need to be addressed prior to a decision.

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

Protection of Children from Environmental Health and Safety Risks (Executive Order 13045) - Children may suffer disproportionately from environmental health and safety risks for many reasons. GDM as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children. GDM activities that may be undertaken by WS may improve the health and safety of environments that children use.

CHAPTER 2: ISSUES AND AFFECTED ENVIRONMENT

2.0 INTRODUCTION

Chapter 2 contains a discussion of the issues, including issues that will receive detailed environmental impact analysis in Chapter 4 (Environmental Consequences), issues that have driven the development of mitigation measures and/or standard operating procedures, 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 descriptions of affected environments will be incorporated into the discussion of the environmental effects in Chapter 4.

2.1 ISSUES ADDRESSED IN THE ANALYSIS OF ALTERNATIVES

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

2.1.1 Issue 1 - Effects on Target Bird Species Populations

A common concern among members of the public is whether wildlife damage management actions adversely affect the viability of target species populations. The target species selected for analysis in this EA are ring-billed gulls, herring gulls, great black-backed gulls, and laughing gulls.

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

A common concern among members of the public and wildlife professionals, including WS' personnel, is the impact of damage control methods and activities on non-target species, particularly T&E species. WS' standard operating procedures (SOPs) include measures intended to mitigate or reduce the effects on non-target species populations and are presented in Chapter 3. To reduce the risks of adverse effects to non-target species, WS would select damage management methods that are target-selective or apply such methods in ways to reduce the likelihood of capturing or killing non-target species.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. WS has consulted with the USFWS under Section 7 of the ESA concerning potential effects of methods on T&E species and has obtained a B.O for programmatic activities. For the full context of the BO, see Appendix F of WS' programmatic FEIS (USDA 1997). WS is also in the process of reinitiating Section 7 consultation at the program level to assure that potential effects on T&E species have been adequately addressed.

Some non-target species may actually benefit from GDM. Federal and state listed T&E colonial waterbirds can benefit from reductions in gull populations, which may compete for nesting space and predate on nests.

2.1.3 Issue 3 - Effects on Human Health and Safety

2.1.3.1 Safety and Efficacy of Chemical Control Methods

The public is sometimes concerned about the chemicals used in bird control programs because of potential adverse effects on people from being exposed either to the chemicals directly or to birds that have been treated with chemicals.

Avitrol, a restricted use pesticide, is a chemical that is classified as an avian distressing agent and is registered for use in Rhode Island. This chemical is normally used to deter target bird species from using certain problem areas. The use of Avitrol is regulated by the EPA through FIFRA and

by Rhode Island Division of Agriculture's Pesticide Laws.

Methyl anthranilate (MA) (e.g., Rejex-it, Goose Chase), a non-lethal repellant registered for use in Rhode Island, might be applied as a repellent in a bird control program. MA causes a negative response to feeding in the treated area.

Anthraquinone (Flight Control™), a non-lethal repellent not currently registered for use in Rhode Island, may be considered for use if it becomes registered in Rhode Island in the future. As part of the planning process, anyalsis of potential impacts of this repellant are being addressed in this EA to determine potential impacts if and when Anthraquinone becomes registered for use in the State. Similar to MA, this chemical could be used to cause a negative response to feeding in treated areas.

Alpha-Chloralose (AC), an avian tranquilizer – though not currently used on gulls under the Investigational New Animal Drug (INAD) use for this substance in Rhode Island, may be considered for use if approved by the Food and Drug Administration (FDA) in the future. As part of the planning process, anyalsis of potential impacts of this tranquilizer are being addressed in this EA to determine potential impacts if and when AC becomes registered for use in the State. AC could be used for live-capturing gulls in conflict situations.

2.1.3.2 Effects on Human Health and Safety from Non-Chemical GDM Methods

Some people may be concerned that WS' use of firearms and pyrotechnic bird scaring devices could cause injuries to people. WS' personnel occasionally use small caliber firearms, air guns (air rifles and air pistols), and shotguns to remove or scare birds that are causing damage. Shotguns may also be used on airports to scare or remove birds which pose a threat to aircraft or air passenger safety. WS frequently uses pyrotechnics in noise harassment programs to disperse or move birds. Between 1999 and 2004, 145 rounds of pyrotechnics were used by the WS program in Rhode Island for gull management. During this time, there has not been a single pyrotechnic accident in conjunction with these programs. There is some potential fire hazard to private property from pyrotechnic use. There has never been a fire due to pyrotechnic use by WS' personnel in Rhode Island.

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

2.1.3.3 Effects on Human Health and Safety from Not Conducting GDM

The absence of WS' GDM activities in Rhode Island would result in adverse effects on human health and safety because of the possibility of bird-borne diseases and increases in bird strikes on aircraft.

Property managers fear that the absence of WS' GDM activities would lead to accumulation of gull droppings and feathers near rooftop ventilation systems which may increase the risk of disease transmission to humans. Building maintenance workers are also at risk for being attacked by gulls nesting on rooftops. WS conducts monitoring for the presence of bird-borne diseases such as West Nile virus and avian influenza that could threaten human health.

WS assists airport management who seek to resolve wildlife hazards to aviation in Rhode Island. Airport managers and air safety officials are concerned that the absence of a WS GDM program could lead to a failure to adequately address complex wildlife hazard problems faced by the

aviation community. Hence, potential effects of not conducting such work could lead to an increased incidence of human injuries or loss of life due to gull bird strikes to aircraft.

2.1.4 Issue 4 - Effects on Socio-Cultural and Economics of the Human Environment

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

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

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

The public's ability to view wild birds in a particular area would be more limited if the birds are removed or relocated. However, immigration of birds from other areas could replace the animals removed or relocated during a damage management action. The opportunity to view or feed other wildlife would also be available if an individual makes the effort to visit other parks or areas with adequate habitat and local populations of the species of interest. In addition, WS' GDM actions rarely remove all birds or even all birds of one species from a locale where actions occur.

Some people do not believe that wild birds should even be harassed to stop or reduce damage problems. Some of them are concerned that their ability to view birds is lessened by WS non-lethal harassment efforts.

Some individuals are offended by the presence of gulls. These people may view gulls as nuisances. Their overall enjoyment of other birds is diminished by what they view as a destructive presence of such species. They are offended that such birds proliferate in such numbers and appear to remain unchecked.

2.1.4.2 Effects on Aesthetics and Value of Property Damaged by Birds

Property owners that have gulls roosting or nesting on their buildings are generally concerned about the negative aesthetic appearance of bird droppings and the damage to their buildings. Business owners generally are particularly concerned because negative aesthetics can result in lost business. Costs associated with property damage include labor and supplies to clean and disinfect fecal droppings, implementation of non-lethal wildlife management methods, loss of aesthetic value of flowers, gardens, and lawns which may be covered by droppings, loss of personal use, loss of customers or visitors irritated by the odor of, or of having to walk on, fecal droppings, and loss of time contacting local health departments and wildlife management agencies to resolve the health and safety issues.

2.1.5 Issue 5 - Humaneness and Animal Welfare Concerns of Methods Used by WS

The issue of humaneness and animal welfare, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Schmidt (1989) indicated that vertebrate pest damage management for societal benefits could be compatible with animal welfare

concerns, if *" . . . the reduction of pain, suffering, and unnecessary death is incorporated in the decision making process."*

Suffering is described as a *" . . . highly unpleasant emotional response usually associated with pain and distress."* However, suffering *" . . . can occur without pain . . . ,"* and *". . . pain can occur without suffering . . ."* (American Veterinary Medical Association (AVMA) 1987). Because suffering carries with it the implication of a time frame, a case could be made for *" . . . little or no suffering where death comes immediately . . ."* (California Department of Fish and Game (CDFG) 1991), such as shooting.

Defining pain as a component in humaneness of WS methods appears to be a greater challenge than that of suffering. Pain obviously occurs in animals. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would *" . . . probably be causes for pain in other animals . . ."* (AVMA 1987). However, pain experienced by individual animals probably ranges from little or no pain to considerable pain (CDFG 1991).

Pain and suffering, as it relates to WS' damage management methods, has both a professional and lay point of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *" . . . neither medical nor veterinary curricula explicitly address suffering or its relief"* (CDFG 1991).

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

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

WS' personnel are experienced and professional in their use of management methods so that they are as humane as possible. Mitigation measures and SOPs used to maximize humaneness are listed in Chapter 3.

2.2 ISSUES CONSIDERED BUT NOT IN DETAIL WITH RATIONALE

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

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

If a determination is made through this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative effects, one EA analyzing impacts for the entire State may provide a better analysis than multiple EAs covering smaller zones.

2.2.2 WS' Effect on Biodiversity

The WS program does not attempt to eradicate any species of wildlife in Rhode Island. WS operates in accordance with international, federal and state laws, and regulations enacted to ensure species viability. Effects on target and non-target species populations because of WS' lethal GDM activities are minor, as shown in Section 4.1.1 and 4.1.2. The effects of the current program on biodiversity are not significant nationwide or statewide (USDA 1997).

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

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

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

2.2.4 Wildlife Damage Management Should Not Occur at Taxpayer Expense, but Should Be Fee-Based

WS 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. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for WS comes from a variety of sources in addition to federal appropriations. Such non-federal sources include State general appropriations, local government funds (county or city), funds from businesses, and private funds which are all applied toward program operations. Federal, state, and local officials have decided that some GDM by WS should be conducted by appropriating funds. Additionally, wildlife damage management is appropriate 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.

A minimal federal appropriation is allotted for the maintenance and implementation of a WS program in Rhode Island. The remainder of the WS program is entirely fee-based. Technical assistance is provided to requesters as part of the federally-funded activities. The direct assistance in which WS' employees perform damage management activities is primarly funded through cooperative agreements between the requester and WS. Thus, GDM by WS in Rhode Island is fee-based to a high degree.

2.2.5 Cost Effectiveness of GDM

The CEQ does not require a formal, monetized cost benefit analysis to comply with NEPA. Consideration of this issue is not essential to making a reasoned choice among the alternative being considered. However, the methods determined to be most effective to reduce damages and threats to human safety caused by gulls and prove to be the most cost effective will receive the greatest application. Additionally, management operations may be constrained by cooperator funding and/or objectives and needs.

An analysis of cost-effectiveness in many GDM situations is exceedingly difficult or impossible to perform because the value of benefits is not readily determined. For example, the potential benefit of eliminating gulls from nesting on industrial rooftops could reduce incidences of illness among unknown numbers of

building users. Since some bird-borne diseases are potentially fatal, or severely debilitating, the value of the benefit may be high. However, no studies of disease problems with and without GDM have been conducted, and, therefore, the number of cases prevented by effective GDM is not possible to estimate. While WS may conduct collaborative activities that help examine disease issues, it is rarely possible to conclusively prove that birds are responsible for individual disease cases or outbreaks.

Another example is the control of some wildlife species in order to protect other wildlife species, such as T&E species. There are no monetary values placed on these wildlife species, yet their existence is important in conserving biodiversity.

2.2.6 GDM should be Conducted by Private Nuisance Wildlife Control Agents

Private nuisance wildlife control agents could be contacted to reduce bird damage for property owners or property owners could attempt to reduce their own damage problems. Some property owners would prefer to use a private nuisance wildlife control agent because the nuisance wildlife agent is located in closer proximity and thus could provide the service at less expense, they are not required to comply with NEPA, or because they prefer to use a private business rather than a government agency. However, some property owners would prefer to contract with a government agency. In particular, large industrial businesses and cities and towns may prefer to use WS because of security and safety issues, legal requirements to be accountable to the public through NEPA compliance and reduced administrative burden.

CHAPTER 3: ALTERNATIVES

3.0 INTRODUCTION

Chapter 3 contains a discussion of the project alternatives, which will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences). Chapter 3 also discusses alternatives considered but not analyzed in detail, with rationale. Minimization measures and SOPs for GDM in Rhode Island are also discussed in Chapter 3. Alternatives were developed for consideration through WS' Decision Model (Slate et al. 1992, USDA 1997) and consultation with the USFWS and the RIDEM.

3.1 DESCRIPTION OF THE ALTERNATIVES

3.1.1 Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

The proposed action is to continue the current of GDM program as conducted by WS using an integrated approach to address damage and threats associated with ring-billed gulls, herring gulls, great black-backed gulls, and laughing gulls in the State of Rhode Island. An IWDM approach would be implemented to reduce damage activities to property, agriculture, threatened and endangered species, other wildlife, natural resources, aquaculture, and human health and safety. Damage management would be conducted on public and private property in Rhode Island when the resource owner (property owner) or manager requests WS' assistance. An IWDM strategy would be recommended and used, encompassing the use of practical and effective methods of preventing or reducing damage while minimizing harmful effects of damage management measures on humans, target and non-target species, and the environment. Under this action, WS could provide technical assistance and direct operational damage management, including non-lethal and lethal management methods by applying the WS Decision Model (Slate et al. 1992). When appropriate, physical exclusion, habitat modification, repellents, or harassment would be recommended and utilized to reduce damage. In other situations, birds would be removed as humanely as possible using: shooting, registered pesticides, trapping, egg addling/destruction, nest destruction, or euthanasia following live capture by trapping. In determining the damage management strategy, preference would be given to practical and effective non-lethal methods. However, non-lethal methods may not always be applied as a first response to each damage problem. The most appropriate response could often be a combination of non-lethal and lethal methods, or there could be instances where application of lethal methods alone would be the most appropriate strategy. Appendix B provides a more detailed description of the methods that could be used under the proposed action.

Integrated Wildlife Damage Management

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. The philosophy behind IWDM is to implement the best combination of effective management methods in a cost-effective[4] manner while minimizing the potentially harmful effects on humans, target and non-target species, and the environment. IWDM may incorporate cultural practices (e.g., animal husbandry), habitat modification (e.g., exclusion, vegetation management), animal behavior modification (e.g., scaring, repellents), removal of individual offending animals (e.g., trapping, shooting, avicides), local population reduction, or any combination of these, depending on the circumstances of the specific damage problem. As part of an integrated approach to managing damage caused by gulls, WS would conduct both technical assistance and direct operation assistance to those requesting service.

Technical Assistance Recommendations

Technical assistance as used herein is information, demonstrations, and advice on available and appropriate wildlife damage management methods. The implementation of damage management actions is the responsibility of the requester. In some cases, WS provides supplies or materials that are of limited availability for non-WS entities to use. Technical assistance may be provided through a personal or

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

telephone consultation, or during an on-site visit with the requester. Generally, several management strategies are described to the requester for short and long-term solutions to damage problems; these strategies are based on the level of risk, need, and the practicality of their application.

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

Direct Damage Management Assistance

This is the implementation or supervision of damage management activities by WS' personnel. Direct damage management assistance may be initiated when the problem cannot effectively be resolved through technical assistance alone, and when cooperative service agreements or other comparable documents provide for direct damage management by WS. The initial investigation defines the nature, history, extent of the problem, species responsible for the damage, and methods that would be available to resolve the problem. Professional skills of WS' personnel are often required to effectively resolve problems, especially if restricted use chemicals are necessary, or if the problems are complex.

Educational Efforts

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

Research and Development

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

WS Decision Making Process

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

Examples of WS' Direct Operational and Technical Assistance in GDM in Rhode Island

Management of Wildlife Hazards to Aircraft and Air Passengers in Rhode Island

WS participates with the FAA under a MOU to provide wildlife damage management information or services, upon request, to airport managers in Rhode Island. Sometimes WS evaluates wildlife hazards at airports and then provides Wildlife Hazard Assessments which outline wildlife hazards found, and assists airports in developing Wildlife Hazard Management Plans to address wildlife threats. These plans may include specific recommendations to reduce threats associated with a particular wildlife species, including gulls. WS also sometimes assists airport managers in obtaining USFWS depredation permits for the purpose of managing hazard threats posed by migratory birds, including gulls. IWDM strategies are recommended and employed for these facilities.

In addition to direct operational activities consisting of various harassment, and lethal removal techniques aimed at potentially injurious wildlife, WS' personnel provide ongoing technical advice to airport managers about how to reduce the presence of wildlife in airport environs. WS may also participate in various habitat management projects implemented by airport personnel in order to provide technical expertise about specific wildlife damage management strategies and methods. In addition, WS promotes improved bird strike record keeping and maintains a program of bird identification and monitoring of bird numbers at participating airports.

WS may receive requests for assistance in resolving wildlife hazards to aviation in the future from airport management previously discussed, or any other airports in Rhode Island. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in airport environments.

Management of Damage Caused by Gulls

Landfills - WS currently provides information or services, upon request, to landfills in Rhode Island. WS assists with reducing the number of gulls, particularly ring-billed gulls, herring gulls, and great black-backed gulls, feeding and loafing at the landfills. WS also may assist landfill operators in obtaining USFWS depredation permits for managing migratory bird damage. WS uses and recommends IWDM strategies for these facilities.

WS may receive requests for assistance in resolving wildlife hazards in the future from landfill operators previously discussed, or any other landfill in Rhode Island. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use at landfills.

Urban Nesting Gull Colonies - WS provides information or services, upon request, to property owners in Rhode Island to reduce the number of nesting gulls, particularly herring gulls and great black-backed gulls, in urban environments. WS may assist property owners with obtaining a USFWS depredation permit for managing these urban nesting colonies. IWDM strategies are recommended and used for these situations.

The main direct control activity used to manage these urban nesting colonies, particularly those located on rooftops, is nest and egg removal. Nest trapping is also used to reduce the nesting population on some rooftops. As part of the IWDM strategy, WS also recommends harassment with distress tapes and scare tactics prior to the nesting season or construction of a rooftop grid wire system to exclude birds from the roof.

WS may receive requests for assistance in resolving conflicts with gulls in the future from properties previously discussed, or any other property owners in Rhode Island. WS may provide technical assistance and/or direct operational assistance using any combination of approved methods discussed in this EA which are appropriate for use in urban environments.

Bird Damage Management Methods Available for Use (See Appendix B)

Nonchemical, Non-lethal Methods

Agricultural producer and property owner practices consist primarily of non-lethal preventative methods such as **cultural methods**[5] and **habitat modification**.

Animal behavior modification refers to tactics that alter the behavior of birds to reduce damages. Some, but not all, of these tactics include exclusion methods such as netting, propane exploders to disperse birds, pyrotechnics, distress calls and sound producing devices, visual repellents and scaring tactics, and lasers.

Dispersal of damaging birds to other areas.

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

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

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

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

Chemical, Non-lethal Methods

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

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

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

Other repellents: Other bird repellents that might become available for use in RI include charcoal particles (e.g., adhered to livestock feed), anthraquinone (Flight Control™) (Avery et al. 1997), and Alpha-Chloralose. Flight Control™ is a non-lethal bio-pesticide that could be used to reduce feeding activity in treated areas. Alpha-Chloralose is an immobilizing agent, used to capture waterfowl or other birds. It is generally used in recreational and residential areas, such as swimming pools, shoreline residential areas, golf courses, or resorts. Alphoa-chloralose is typically delivered as well-contained bait in small quantities with minimal hazards to pets and humans; single bread or corn baits are fed directly to the target birds.

Mechanical, Lethal Methods

Live traps are various types of traps designed to capture birds alive. Gulls captured in live traps would be euthanized. Some examples are decoy traps, nest box traps, mist nets, and cannon nets.

Shooting is more effective as a dispersal technique than as a way to reduce bird numbers. The number that can be killed by shooting is generally very small in relation to the number involved in damage situations.

[5]Generally involves modifications to the management of protected resources to reduce their vulnerability to wildlife

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, shotguns, or pellet guns (rifles or pistols) 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.

Cervical dislocation is an AVMA approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds which are captured by hand or in live traps.

Chemical, Lethal Methods

Carbon dioxide (CO_2) gas is an AVMA approved euthanasia method (Beaver et al. 2001) which is sometimes used to euthanize birds which are captured in live traps, by hand, or by chemical immobilization and when relocation is not a feasible option. Live birds are placed in a container or chamber into which CO_2 gas is released. The birds quickly expire after inhaling the gas.

Other Lethal Chemicals: Other chemical lethal methods that might become available for use in RI include DRC-1339. DRC-1339 is a chemical for reducing damage from several species of birds, including gulls. This chemical is highly toxic to sensitive species but only slightly toxic to non-sensitive species, including predatory birds and mammals.

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

3.1.2 Alternative 2 - Non-lethal GDM Only By WS

This alternative would require WS to use non-lethal methods only to resolve bird damage problems. Persons receiving technical assistance could still resort to lethal methods that were available to them. Information on lethal GDM methods would still be available to producers and property owners through such sources as USDA-Agricultural Extension Service offices, RIDEM, Division of Fisheries and Wildlife, universities, or pest control organizations. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.1.3 Alternative 3 - Technical Assistance Only

This alternative would not allow for WS' operational GDM in Rhode Island. WS would only provide technical assistance and make recommendations when requested. Producers, property owners, agency personnel, or others could conduct GDM using traps, shooting, Avitrol, or any non-lethal method that is legal. Avitrol could only be used by State certified pesticide applicators. Appendix B describes a number of non-lethal methods available for use by WS under this alternative.

3.1.4 Alternative 4 - No WS GDM Program

This alternative would eliminate WS' involvement in GDM in Rhode Island. WS would not provide direct operational or technical assistance and requesters would have to conduct their own GDM without WS' input. Information on GDM methods would still be available to producers and property owners through such sources as USDA-Agricultural Extension Service offices, RIDEM, universities, or pest control organizations. Avitrol could be used by State certified restricted-use pesticide applicators.

3.2 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

3.2.1 Lethal GDM Only By WS

Under this alternative, WS would not conduct any non-lethal control of gulls for GDM purposes in the State, but would only conduct lethal GDM. This alternative was eliminated from further analysis because some bird damage problems can be resolved effectively through non-lethal means and at times lethal methods may not be available for use due to safety concerns or local ordinances prohibiting the use of some lethal methods, such as the discharge of firearms. For example, a number of damage problems involving the encroachment of injurious birds into buildings can be resolved by installing barriers or repairing of structural damage to the buildings, thus excluding the birds. Further, such damage situations as immediately clearing a runway of a large flock of injurious birds could not be implemented immediately, while scaring them away through noise harassment might resolve the air passengers' threat at once.

3.2.2 Compensation for Gull Damage Losses

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

3.2.3 Short Term Eradication and Long Term Population Suppression

An eradication alternative would direct all WS program efforts toward total long term elimination of gull populations on private, state, local and federal government land wherever a cooperative program was initiated in the State. In Rhode Island, eradication of native bird species is not a desired population management goal of State agencies or WS. Eradication as a general strategy for managing bird damage will not be considered in detail because all state and federal agencies with interest in, or jurisdiction over, wildlife oppose eradication of any native wildlife species and eradication is not acceptable to most people.

Suppression would direct WS' program efforts toward managed reduction of certain problem populations or groups. In areas where damage can be attributed to localized populations of birds, WS can decide to implement local population suppression as a result of using the WS Decision Model. 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 WS program. Typically, WS activities in the State would be conducted on a very small portion of the sites or areas inhabited or frequented by problem species.

3.3 MITIGATION AND STANDARD OPERATING PROCEDURES FOR GDM TECHNIQUES

3.3.1 Mitigation in Standard Operating Procedures

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

- The WS Decision Model thought process which is used to identify effective wildlife damage management strategies and their effects.
- Reasonable and prudent measures or alternatives are identified through consultation with the USFWS and are implemented to avoid effects to T&E species.

- EPA-approved label directions are followed for all pesticide use. The registration process for chemical pesticides is intended to assure minimal adverse effects to the environment when chemicals are used in accordance with label directions.
- All WS' employees 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 methods.
- Research is being conducted to improve GDM methods and strategies so as to increase selectivity for target species, to develop effective non-lethal control methods, and to evaluate non-target hazards and environmental effects.

Some additional mitigating factors specific to the current program include:

- Management actions would be directed toward localized populations or groups of target species and/or individual offending members of those species. Generalized population suppression across the State, or even across major portions of the State, would not be conducted.
- WS uses GDM devices and conducts activities for which the risk of hazards to public safety and hazard to the environment have been determined to be low according to a formal risk assessment (USDA 1997). Where such activities are conducted on private lands or other lands of restricted public access, the risk of hazards to the public is even further reduced.

3.3.2 Additional Mitigation Specific to the Issues

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

3.3.2.1 Effects on Target Bird Species Populations

- GDM 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.
- WS' take is monitored by comparing numbers of birds killed by species or species group with overall populations or trends in populations to assure the magnitude of take is maintained below the level that would cause significant adverse effects to the viability of native species populations (See Chapter 4).

3.3.2.2 Effects on Non-target Species Populations, Including T&E Species

- WS' personnel are trained and experienced to select the most appropriate method for taking problem animals and excluding non-targets.
- Observations of birds in areas that are associated with gull concentrations are made to determine if non-target or T&E species would be at risk from GDM activities.
- WS has consulted with the USFWS regarding potential effects of control methods on T&E species, and abides by reasonable and prudent alternatives (RPAs) and/or reasonable and prudent measures (RPMs) established as a result of that consultation. For the full context of the BO WS' programmatic FEIS, Appendix F (USDA 1997). Further consultation on species not covered by or included in that formal consultation process will be initiated with the USFWS and WS will abide by any RPAs, RPMs, and terms and conditions that result from that process to avoid jeopardizing any listed species.
- WS uses chemical methods for GDM that have undergone rigorous research to prove their safety and lack of serious effects on non-target animals and the environment.

3.3.2.3 Effects on Human Health and Safety

- Damage management activities will be conducted professionally and in the safest manner possible. Most activities will be conducted away from areas of high human

activity and when determined necessary, signs will be placed to warn the public of any potential hazards.

- GDM via shooting will be conducted professionally and in the safest manner possible. Shooting will be conducted during time periods when public activity and access to the control areas are restricted. WS' personnel involved in shooting operations will be fully trained in the proper and safe application of this method.
- WS will use all chemical methods according to label directions to ensure the safety of the public and will use chemical methods in areas where human activity is low

3.3.2.4 Effects on Socio-Cultural and Economics of the Human Environment

- Management actions to reduce or prevent damage caused by gulls in Rhode Island would be directed toward specific individuals identified as responsible for the damage, identified as posing a threat to human safety, or identified as posing a threat of damage.
- All methods or techniques applied to resolve damage or threats to human safety would be agreed upon by entering into a cooperative service agreement, MOU, or comparable document prior to the implementation of those methods.

3.3.2.5 Humaneness and Animal Welfare Concerns of Methods Used by WS

- Personnel will be well trained in the latest and most humane devices/methods for removing problem gulls.
- WS' personnel will attempt to dispatch captured target gulls, slated for lethal removal, as quickly and humanely as possible.
- The NWRC is continually conducting research to improve the selectivity and humaneness of wildlife damage management devices used by personnel in the field.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.0 INTRODUCTION

Chapter 4 provides information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. 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 no action alternative to compare the real or potential effects.

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

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

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

Effects on sites or resources protected under the National Historic Preservation Act: WS' GDM actions are not undertakings that could adversely affect historic resources (See Section 1.7.2)

4.1 ENVIRONMENTAL CONSEQUENCES FOR ISSUES ANALYZED IN DETAIL

4.1.1 Issue 1 - Effects on Target Bird Species Populations

4.1.1.1 Alternative 1 – Integrated GDM Program (Proposed Action/No Action)

Under this alternative, WS would incorporate non-lethal and lethal methods described in Appendix B in an integrated approach in which all or a combination of methods may be employed to resolve a request for assistance. Non-lethal methods can disperse or otherwise make an area unattractive to gulls causing damage thereby, reducing the presence of gulls at the site and potentially the immediate area around the site where non-lethal methods are employed. Non-lethal methods would be given priority when addressing requests for assistance. However, non-lethal methods would not necessarily be employed to resolve every request for assistance if deemed inappropriate by WS' personnel or cooperating agencies.

The use of lethal methods would result in the take of gulls as deemed appropriated by WS' Decision Model and as permitted by USFWS pursuant to the MBTA. The analysis take for magnitude of impact generally follows the process described in Chapter 4 of WS' programmatic FEIS (USDA 1997). Magnitude is described in WS' programmatic FEIS as *". . . a measure of the number of animals killed in relation to their abundance."* Magnitude may be determined either quantitatively or qualitatively. Quantitative determinations are based on population estimates, allowable harvest levels, and actual harvest data. Qualitative determinations are based on population trends and harvest data when available.

Breeding Bird Surveys. Bird populations can be monitored by using data from the Breeding Bird Surveys (BBS). The BBS is a large-scale inventory of North American birds coordinated by the U.S. Geological Survey, Patuxent Wildlife Research Center (Sauer et al. 2007). The BBS is a combined set of over 3,700 roadside survey routes primarily covering the continental United States and southern Canada. The BBS was started in 1966, and routes are surveyed in June by experienced birders. The stated primary objective of the BBS has been to generate an estimate of population change for all breeding birds. Populations of birds tend to fluctuate, especially locally,

as a result of variable annual local habitat and climatic conditions. Trends can be determined using different population equations and statistically tested to determine if a trend is significant. The significance of a trend's change is reflected in the calculated P-value (probability) for that species.

The BBS data is best used to monitor population trends. However, the average number of birds per route (relative abundance) can be used to theoretically estimate the population size (relative abundance/10 mi^2 x 1,545 (total land/water area in Rhode Island in square miles). To use these population estimates the following assumptions would need to be accepted.

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

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

Assessment of Authorized Take

Biological assessments for identifying the potential impact of harvest and/or removal programs on bird populations have a long history of application in the United States. Population modeling and extensive monitoring programs form the basis of an adaptive decision-making process used each year for setting migratory game bird harvest regulations, while ensuring that levels of take are sustainable. Increasing human-wildlife conflicts caused by migratory bird species (both game and nongame), and their potential impacts on sensitive species and their habitats, has resulted in greater use of analytical tools to evaluate the effects of authorized take to achieve population objectives (Runge et al. *In Review*). One such tool is referred to as Potential Biological Removal (PBR) (Wade 1998, Runge et al. 2004).

To use the PBR method to determine levels of allowable take, or cumulative impacts over a large geographic area, the information required includes a minimum estimate of the population size using science-based monitoring programs (BBS, CBC, coordinated colony surveys), and the intrinsic rate of population growth. The formula for PBR is:

$$\text{PBR} = \tfrac{1}{2} R_{max} N_{min} F_R$$

where R_{max} is the maximum population growth rate at low densities, and in the absence of removal

(Runge et al. 2004), N_{min} is the minimum population size, and F_R is a recovery factor ranging from 0.1 to 2.0. The recovery factor is a qualitative assessment that is typically set at low levels for endangered ($F_R = 0.1$) or threatened species ($F_R = 0.5$; Taylor et al. 2000), or if the status of the population is poorly known (Runge et al. 2004). However, using a recovery factor above 1.0 has been discussed for species in which the management objective is to hold the population at a smaller fraction of its carrying capacity (Runge et al. *In Review*).

To estimate R_{max} for great black backed gulls, herring gulls, laughing gulls, and ring-billed gulls, the Slade formula (Slade et al. 1998) was used:

$$1 = p\lambda^{-1} + 1_{\alpha}\, b\lambda^{-\alpha} - l_{\alpha} b p^{(\omega-\alpha+1)}\, \lambda^{-(\omega+1)}$$

where p is adult annual survival rate, $l\alpha$ is the survival rate from birth to age at first reproduction, b is the number of female offspring per female of reproductive age per year, α is the age at first reproduction, ω is the age at last reproduction, and λ is the intrinsic rate of population change. After solving the above equation for λ, R_{max} was estimated as $\ln(\lambda)$. Population parameter estimates were taken from the literature for each gull species (Table 4-1), or in cases where estimates were not available, surrogate estimates from closely-related species were used (Seamans et al. 2007). Because there was uncertainty associated with demographic parameter estimates, allowable take levels were calculated using a simulation approach to estimate a range of R_{max} values with parameter estimates randomly drawn from normal distributions based on reported standard errors (Table 4-1; Seamans et al. 2007). Population estimates (N_{min}) for each species were based on the number of gulls at known breeding colonies in Bird Conservation Regions (BCRs) 14 and 30 during the mid-1990's (USFWS 2008), and adjusted using a conservative estimate of 0.75 non-breeding gulls per breeder to estimate the total population (Seamans et al. 2007). Allowable take levels (± 95 CI) for each of the 4 gull species under 3 recovery factors (0.5, 1.0, 1.5) in BCRs 14 and 30 are presented in Table 4-2.

Table 4-1. Demographic parameter estimates (θ) used for estimating R_{max} and Potential Biological Removal of gulls in BCR 14 and 30 (Seamans et al. 2007).

		Great black-backed gull[1]		Herring gull[2]		Laughing gull[3]		Ring-billed gull[4]	
Parameter	Age class	(θ)	SE (θ)	(θ)	SE (θ)	(θ)	SE (θ)	(θ)	SE (θ)
p	Adult	0.87	0.03	0.87	0.03	0.87	0.03	0.87	0.03
$l\alpha$	Adult	0.42		0.42		0.56		0.56	
	Hatch Year	0.729	0.035	0.729	0.035	0.729	0.035	0.729	0.035
	Second Year	0.886	0.024	0.886	0.024	0.886	0.024	0.886	0.024
b		0.784	0.018	0.752	0.022	0.752	0.022	0.752	0.022
α		5		5		3		3	
ω		19		20		19		19	
N_{min}		250,000		390,000		270,000		54,000	
R_{max}		0.09	0.027	0.086	0.027	0.113	0.036	0.113	0.036

[1]Good 1998
[2]Pierotti and Good 1994
[3]Burger 1996, Dinsmore and Schreiber 1974
[4]Ryder 1993, Seamans et al. 2007

Table 4-2. Potential Biological Removal (± 95% CI) of laughing gulls, herring gulls, great black-backed gulls, and ring-billed gulls in Bird Conservation Regions 14 and 30, under 3 recovery factors (Seamans et al. 2007).			
Species	$F_R = 0.5$	$F_R = 1.0$	$F_R = 1.5$
Laughing Gull	7,685 (3,927 – 12,685)	15,274 (7,188 – 23,042)	26,044 (10,798 – 34,818)
Herring Gull	8,360 (3,892 – 12,656)	16,725 (7,788 – 25,397)	25,048(11,716 – 37,875)
Great Black-backed Gull	5,614 (2,764 – 8,358)	11,234 (5,561 – 16,670)	16,853 (8,364 – 25,086)
Ring-billed Gull	1,532 (713 – 2,318)	3,065 (1,455 – 4,634)	4,588 (2,161 – 6,951)

Ring-billed Gull Population Effects

Ring-billed gulls are migratory birds which prefer to nest on islands with sparse vegetation. The breeding population of ring-billed gulls is divided into two populations; the western population and the eastern population. The eastern breeding population of the United States includes New York, Vermont, Ohio, Illinois, Michigan, Wisconsin, and Minnesota (Blokpoel and Tessier 1986). The breeding population of ring-billed gulls in New York can be found on Lake Champlain, the St. Lawrence River, the lower Great Lakes, and Oneida Lake (Bull 1974, Peterson 1985). Ring-billed gulls nest in high densities and, in the Great Lakes region, nesting colonies may be located on islands, parklands, slag yards, rooftops, breakwalls, and landfills (Blokpoel and Tessier 1986).

Currently there are no known breeding ring-billed gull colonies in Rhode Island. However, ring-billed gulls do have a year round presence and can be observed throughout much of the state. In 1984, the population of ring-billed gulls in the Great Lakes region was estimated at approximately 648,000 pairs (Blokpoel and Tessier 1986). Blokpoel and Tessier (1992) found that the nesting population of ring-billed gulls in the Canadian portion of the lower Great Lakes system increased from 56,000 pairs to 283,000 pairs from 1976-1990. According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. According to Sauer et al. (2007) the population of ring-billed gulls has increased throughout the United States, the Eastern Breeding Bird Survey (BBS) region and USFWS Region 5 at an annual rate of 2.2%, 1.6%, and 4.2%, respectively, from 1966-2006.

According to the USFWS Waterbird Conservation for the Americas website's Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes Region Appendix 1 (USFWS 2008), ring-billed gulls are considered a species of least concern. Almost 41,000 ring-billed gulls are believed to breed in BCR 14. There is no known breeding in BCR 30 which includes all of Rhode Island.

Ring-billed gulls are protected by the USFWS under the MBTA. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the RIDEM permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on ring-billed gull populations would have no significant adverse impact on the quality of the human environment.

The USFWS authorized take of ring-billed gulls by all entities in Rhode Island since 2002 are listed in Table 4-3. The highest level of reported take occurred in 2003 when 167 ring-billed gulls were taken by all authorized entities in Rhode Island though it only represented 12% of the take allowed under all permits issued. In 2006, the USFWS authorized take for 380 ring-billed gulls in Rhode Island, with 16 birds reported taken of the 380 authorized for take. This includes those ring-billed gulls taken by WS (J. Dyer, USFWS, pers. comm. 2007). From FY 1999 through FY 2007, WS' take of ring-billed gulls at all project sites in the State in all damage situations under USFWS issued permits totaled 14 gulls.

Table 4-3. Number of permits issued, number authorized for take, total reported take and percentage of take to authorized take for Ring-billed Gulls in Rhode Island, 2002-2007.

Ring-billed Gulls				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	4	625	159	25%
2003	11	1350	167	12%
2004	9	1030	7	<1%
2005	6	425	0	0%
2006	4	380	16	4%
2007[1]	7	415	0	0%

[1]Incomplete data

The USFWS also authorized ring-billed gull nests to be destroyed as part of depredation permits to prevent and alleviate damage. The number of permits to destroy ring-billed gull eggs and the reported take are shown in Table 4-4. Since 2002, the destruction of nests in Rhode Island has not been reported by any entity authorized through a depredation permit.

Table 4-4. Number of permits issued, number authorized for take, total reported take, and percentage of take to authorized take for Ring-billed Gulls in Rhode Island, 2002-2007.

Ring-billed Gull Nests				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	4	200	0	0%
2003	11	625	0	0%
2004	9	325	0	0%
2005	6	325	0	0%
2006	4	300	0	0%
2007[1]	7	325	0	0%

Based on past requests for WS' assistance and a predicted increase in future requests for assistance to manage damage and threats associated with ring-billed gulls, WS anticipates that no more than 200 ring-billed gulls would likely be taken annually by WS in Rhode Island under the proposed action. WS anticipates an increase in need to address damage and threats associated with ring-billed gulls at airports, landfills, and from gull nesting on rooftops.

Based on the best available information described above, WS' potential impacts to populations of ring-billed gulls has been and is expected to continue to be insignificant to the overall viability and reproductive success of this bird species population on a local, regional, and nationwide scale. This determination is based on the increasing regional trends of ring-billed gull populations as derived from BBS data and PBR data for BCR 14 and BCR 30. With $F_R = 1.0$ to maintain current population levels, the PBR model predicts ring-billed gulls in BCR 14 and BCR 30 could sustain a harvest of 3,065 individuals (See Table 4-2). WS' take and all known take in Rhode Island since 2002 have not reached a level that indicates an adverse impact to ring-billed gull populations in occurring. With management authority over migratory birds, the USFWS could impose stricter take limits if warranted based on population data.

Herring Gull Population Effects

Herring gulls are the most widely distributed gulls in the Northern Hemisphere. These gulls breed in colonies near oceans, lakes, or rivers (Bent 1921). Herring gulls nest all along the Great Lakes and will nest in natural or man-made sites, such as rooftops and breakwalls (Blokpoel and Scharf 1991b). In Rhode Island, herring gulls nest on islands in Narragansett Bay and on Block Island. Herring gulls also increasingly nesting on man-made structures, particularly on rooftops. This has been observed by WS' personnel in North Kingstown and Newport, Rhode Island. One rooftop

colony had such nest site fidelity that when the building was demolished and the area leveled, the gulls proceeded to ground nest at the site.

The RIDEM estimates the number of breeding pairs at approximately 2,402 at 21 nesting sites for the state of Rhode Island. According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. Therefore, the total herring gull population (breeders and non-breeders) for the state of Rhode Island is estimated at approximately 7,206 gulls. BBS results from 1966-2006 show that the population of herring gulls throughout the United States, the Eastern BBS region, USFWS Region 5, and Rhode Island have decreased at an annual rate of -2.2%, -3.6%, -0.7% and, -15.2%, respectively (Sauer et al. 2007).

The rate of decline observed in Rhode Island appears to be significant. However, the Regional Credibility Measure for Rhode Island reflects data with an important deficiency. In particular this can be due to: 1) the regional abundance being less than 0.1 birds/route (very low abundance), 2) the sample is based on less than 5 routes for the long term, or is based on less than 3 routes for either subinterval (very small samples), or 3) The results are so imprecise that a 5%/year change would not be detected over the long-term (very imprecise).

Counts from 1995 to 2005 indicate no herring gulls were counted during the BBS (Sauer et al. 2007). WS has been conducting gull nest removal activities in Rhode Island since 2000 (D.Wilda, WS, pers. comm. 2008). It is WS belief that BBS survey data is not an accurate representation of herring gull numbers in Rhode Island over this period based on requests for assistance receive to alleviate damage caused by herring gulls, particularly from rooftop nesters.

Christmas Bird Count data for the 10 year period from 1998 to 2007 show a relatively stable winter herring gull population in Rhode Island (NAS 2002). The average number of herring gulls observed and the average number of herring gulls observed per party hour were 5,784.7 and 21.45 with standard deviations of 1,276.27 and 4.97 respectively. The minimum number of herring gulls observed per year was 4,150 in 2005 and the maximum was 8,281 in 2006. The minimum number of herring gulls observed per party hour was 15.2217 in 2005 and the maximum was 29.2889 in 2001 (NAS 2002).

According to the USFWS Mid-Atlantic/New England/Maritimes Waterbird Conservation Plan Website (USFWS 2008), herring gulls are considered a species of low concern in North America. Almost 91,000 herring gulls are believed to breed in BCR 30. Of these, over 36,000 are in Southern New England, which includes all of Rhode Island. In addition, over 196,000 herring gulls are believed to breed in the neighboring BCR 14 (USFWS 2008).

Herring gulls are protected by the USFWS under the MBTA. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the RIDEM permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on herring gull populations would have no significant adverse impact on the quality of the human environment. In 2006, the USFWS authorized take for 475 herring gulls in Rhode Island, while 153 birds were reported taken by permits. Also in 2006, the USFWS authorized take of 430 herring gull nests, while 101 were taken and destroyed (See Table 4-5). Both take and nest destruction numbers include those taken by WS (J. Dyer, USFWS, pers. comm. 2007).

From FY 2002 through FY 2007, WS' take of herring gulls at all project sites in the State in all damage situations under USFWS issued permits totaled 186 gulls. Based on past requests for WS' assistance and a predicted increase in future requests for services, WS anticipates take could increase up to 300 herring gulls annually based on an increase in requests for assistance to manage damage and threats associated with gulls.

Table 4-5 list the number of permits issued by the USFWS since 2002 and the reported take of herring gulls in Rhode Island by all entities authorized by a permit. The USFWS authorized 725 gulls to be taken by all entities issued a permit in 2007. WS' take of 95 herring gulls represented 12.3% of the authorized take by all entities issued permits in Rhode Island. WS' take of 95 herring gulls in 2007 constituted the highest level of take by WS since 2002.

Table 4-5. Number of permits issued, number authorized for take, total reported take and percentage of take to authorized take for herring gulls in Rhode Island, 2002-2007.

Herring Gulls						
Year	No. of Permits	Authorized Take	Reported Take	Percent Take	WS' Take	WS' % Take
2002	6	725	190	26.21%	0	0.00%
2003	11	1150	352	30.61%	6	0.52%
2004	10	1325	254	19.17%	55	4.15%
2005	7	775	248	32.00%	17	2.19%
2006	7	475	153	32.21%	13	2.74%
2007	9	725	51[1]	7.03%	95[2]	12.26%

[1]Incomplete data
[2] Unpublished WS data

Impacts due to nest and egg removal and destruction and egg addling and oiling activities should have little adverse impact on the herring gull population regionally and in Rhode Island. These two methods are considered non-lethal when conducted before the development of an embryo. Additionally, herring gulls are a long lived species with the ability to identify areas with regular human disturbance and low reproductive success and to relocate and nest elsewhere when confronted with repeated nest failure. Table 4-6 shows the number of nests authorized to be destroyed by the USFWS under permits in Rhode Island since 2002.

Although there may be reduced fecundity for the individuals affected, this activity has no long term effect on breeding adult herring gulls. Nest and egg removal and destruction is not used by WS as a population control method. This method is used by WS to inhibit nesting in an area receiving damage due to nesting activity and is intended to relocate a nesting pair or colony of herring gulls to an area where there are no conflicts.

Egg addling or oiling is a similar method but would be used primarily as a population control method, where herring gull eggs are shaken, punctured, frozen, or coated in food grade vegetable oil and returned to the nest for continued incubation. This results in the adult gulls tending the treated eggs until the nesting season has concluded and there is no chance of producing a viable nest. It should have no more impact than nest and egg removal due to the limited number of nesting individuals it would affect and due to the limited number of occasions WS would employ this method. All nest and egg destruction would occur pursuant to permits authorizing such action by the USFWS.

Table 4-6. The number of permits issued and herring gull nests reported destroyed in Rhode Island, 2002-2007.

Herring Gull Nests						
Year	No. of Permits	Authorized Take	Reported Take	Percent Take	WS' Take	WS % Take
2002	6	300	104	34.67%	76	25.33%
2003	11	900	79	8.78%	51	5.67%
2004	10	600	170	28.33%	17	2.83%
2005	7	500	77	15.40%	47	9.40%
2006	7	430	101	23.49%	10	2.33%
2007[1]	9	700	73	10.43%	53	7.57%

WS' anticipates no more than 10% of the herring gull nests in Rhode Island would be affected annually by WS egg and nest removal or addling/oiling. The maximum percentage of herring gull nests taken during a single year from 2002 to 2007 by WS in Rhode Island was 3.2%. This is based on 76 nests taken of an estimated 2,402 nests in 2002. The estimated number of nests is derived from the estimated number of nesting pairs of herring gulls in Rhode Island. To exceed 10% would require an increase in take of herring gull nests of 318% over the 2002 take.

Based upon the above information, Rhode Island WS potential impacts to populations of herring gulls has been and is expected to continue to be insignificant to the overall viability and reproductive success of this bird species population on a local, regional, and nationwide scale. This determination is based on the best available information indicating that herring gull populations are not adversely affected by WS' damage management activities in Rhode Island. WS' take since 2002 has not reached a level that would indicate an adverse impact has or will occur from WS' activities in Rhode Island. The PBR model predicts that with $F_R = 1.0$, herring gulls populations could sustain a harvest of 16,725 in BCR 14 and BCR 30 based on the best available information. WS' proposed take of up to 300 along with take by other entities in Rhode Island will have no adverse impact on herring gull populations in Rhode Island. The permitting of take by the USFWs provides outside evaluation to ensure WS' take occurs within the allowed limits to maintain viability and growing populations.

Great Black-backed Gull Population Effects

The great black-backed gull is basically a marine species, which breeds in the North Atlantic region. In the United States the great black-backed gull breeds south to Long Island (Bull 1974). During the winter these gulls can also be found along the Great Lakes and larger rivers, such as the St. Lawrence River (Angehrn et al. 1979, Bull 1974). The over-wintering population of great black-backed gull has been increasing along the Great Lakes, along with the expansion of their breeding range (Angehrn et al. 1979).

The RIDEM estimates the number of breeding pairs at approximately 1,320 at 26 sites in the state of Rhode Island. According to Dolbeer (1998) the number of non-breeding gulls (sub-adults and non-breeding adults) is estimated to equal about 50% of the nesting population. Therefore the total great black-backed gull population (breeders and non-breeders) for the state of Rhode Island is estimated at approximately 3,960 great black-backed gulls.

Data from the BBS (1966-2006) shows that the great black-backed gull population in Southern New England, USFWS Region 5, Eastern BBS region, and throughout the United States has declined at an annual rate of -4.3%, -4.3%, -2.7%, and -4.5%, respectively. From 1966 to 1979, there was an increase of 14.4%, 0.8%, 2.9% and 0.8% respectively in these same areas (Sauer et al. 2007). No BBS data is available specifically for Rhode Island. Canada Wildlife Service reports that the population figures for the great black-backed gull populations in the Northeast (i.e., along the St. Lawrence River) have soared in the last twenty years (Canadian Wildlife Service 2002).

According to the USFWS (2008), great black-backed gulls are considered a species of lowest concern in North America and BCR 30. Over 37,000 great black-backed gulls are believed to breed in BCR 30. Of these, over 25,500 are in Southern New England, which includes all of Rhode Island.

Great black-backed gulls are protected by the USFWS under the MBTA. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the RIDEM permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on great black-backed gull populations would have no significant adverse impact on the quality of the

human environment. In 2006, the USFWS authorized take for 505 great black-backed gulls in Rhode Island, while 16 birds were reported taken by permits (See Table 4-7). This includes those taken by WS. Also in 2006, the USFWS authorized take of 430 great black-backed gull nests but none were taken or destroyed (J. Dyer, USFWS, pers. comm. 2007).

Table 4-7. Number of permits issued, number authorized for take, reported take and percentage of take to authorized take for great black-backed gulls in Rhode Island, 2002-2007.

Great Black-backed Gulls				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	4	625	87	14%
2003	11	1375	111	8%
2004	11	1105	22	2%
2005	7	525	25	5%
2006	7	505	16	3%
2007[1]	10	565	0	0%

[1]Incomplete data

From FY 1999 through FY 2007, WS took 63 great black-backed gulls in Rhode Island at all project sites in the State in all damage situations under USFWS issued permits. Based on past requests for WS' assistance and a predicted increase in future requests for services, WS anticipates that no more than 200 great black-back gulls would likely be taken annually by WS in Rhode Island under the proposed action. Between 2002 and 2007, WS has taken a total of 12 great black-backed gulls in Rhode Island. The highest number of great black-backed gulls taken by WS during a single year in Rhode Island is 6 or .15% of the estimated population in 2007.

WS anticipates no more than 10% of the great black-backed gull nests in Rhode Island would be affected annually by WS' egg and nest removal or addling/oiling. WS has not removed any great black-backed gull nests or addled/oiled any great black-backed gull eggs in Rhode Island from 2002 to 2007. To exceed 10% would require WS to remove and destroy or addle/oil eggs in 132 nests, based on the estimate of 1,320 nesting pairs in Rhode Island.

The total number of nests and eggs reported as destroyed in Rhode Island are listed in table 4-8. The highest level of allowed take occurred in 2003, when 650 nests were authorized to be destroyed in Rhode Island under permit by the USFWS. The highest number of nests destroyed was also reported in 2003 when 5 nests were reported as destroyed by entities in Rhode Island with authorization permits. Since 2002, nest destruction has only been reported in 2003 by all entities authorized to destroy nests.

Table 4-8. Number of permits issued, number authorized for take, total reported take and percentage of take to authorized take of great black-backed gull nests in Rhode Island, 2002-2007.

Great Black-backed Gull Nests				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	4	200	0	0%
2003	11	650	5	<1%
2004	11	450	0	0%
2005	7	350	0	0%
2006	7	400	0	0%
2007[1]	10	450	0	0%

Based upon the above information, WS potential impacts to populations of great black-backed gulls has been and is expected to continue to be insignificant to the overall viability and reproductive success of this bird species population on a local, regional, and nationwide scale. WS' anticipated take of up to 200 great black-backed gulls annually will not have a negative

impact on populations in Rhode Island or regionally. The PBR model, based on $F_R = 1.0$, predicts take of 11,234 great black-backed gulls would not adversely impact gulls populations in BCR 14 or BCR 30 (See Table 4-2). WS' annually reports take of gulls to the USFWS to ensure take by WS is incorporated and evaluated in population objectives established by the USFWS for gull species in Rhode Island and regionally.

Laughing Gull Population Effects

The Laughing Gull is a small, black-hooded gull that nests in colonies of up to 25,000 pairs on sandy or rocky shores and on salt-marsh islands along the Atlantic and Gulf coasts of North America, as well as on some Caribbean islands, the Gulf of California, and along the Pacific coast of Mexico.

Currently there are no known breeding laughing gull colonies in Rhode Island. However, laughing gulls do have a year round presence and can be observed throughout much of the state. Data from the BBS (1966-2006) shows that the laughing gull population in the USFWS Region 5, Eastern BBS region, and throughout the United States has increased at an annual rate of 3.1%, 3.5% and 3.3%, respectively (Sauer et al. 2007). There is no known nesting in Rhode Island; however, there are active colonies in nearby New York and neighboring Massachusetts. According to the USFWS (2008), laughing gulls are considered a species of lowest concern in North America and BCR 30. Over 202,500 laughing gulls are believed to breed in BCR 30. Of these, over 13,500 are in Southern New England, which includes all of Rhode Island.

Laughing gulls are protected by the USFWS under the MBTA. Therefore, gulls are taken in accordance with applicable state and federal laws and regulations authorizing take of migratory birds; and their nest and eggs, including the USFWS and the RIDEM permitting processes. The USFWS, as the agency with migratory bird management responsibility, could impose restrictions on depredation harvest as needed to assure cumulative take does not adversely affect the continued viability of populations. This should assure that cumulative impacts on laughing gull populations would have no significant adverse impact on the quality of the human environment. In 2006, the USFWS authorized take for 300 laughing gulls in Rhode Island (See Table 4-9). No laughing gulls were reported taken by permits in 2006 (J. Dyer, USFWS, pers. comm. 2007).

Table 4-9. Number of permits authorized and reported take for laughing gulls in Rhode Island, 2002-2007.

Laughing Gulls				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	0	0	0	0
2003	5	625	0	0%
2004	3	305	5	2%
2005	2	375	0	0%
2006	1	300	0	0%
2007[1]	2	305	0	0%

[1]Incomplete data

From FY 1999 through FY 2007, WS took 2 laughing gulls at all project sites in the State in all damage situations under USFWS issued permits. Based on past requests for WS' assistance and a predicted increase in future requests for services, WS anticipates that no more than 100 laughing gulls would likely be taken annually by WS in Rhode Island under the proposed action. The increase in take is based on an anticipated increase in requests for assistance to manage gulls at landfills and airports in the State.

The take of nests by all authorized entities in Rhode Island is present in Table 10. Although nest destruction was authorized since 2003, no nests of laughing gulls have been reported as destroyed in Rhode Island. WS has not destroyed nests of laughing gulls in Rhode Island.

Table 4-10. Number of permits authorized and reported take for Ring-billed Gulls in Rhode Island, 2002-2007.

Laughing Gull Nests				
Year	No. of Permits	Authorized Take	Reported Take	Percent Take
2002	N/A	N/A	N/A	N/A
2003	5	305	0	0%
2004	3	5	0	0%
2005	2	0	0	0%
2006	1	0	0	0%
2007[1]	2	0	0	0%

To maintain current population levels, the PBR predicts a total of 15,274 laughing gulls could be taken annually based on $F_R = 1.0$ in BCR 14 and BCR 30 (See Table 4-2). WS' anticipated take of 100 laughing gulls annually in Rhode Island will have no adverse impact on laughing gull populations in Rhode Island. With the USFWS permitting take of laughing gulls, consideration of all take will be evaluated and calculated to ensure populations of laughing gulls are maintained and continue to grow. Based upon the above information, Rhode Island WS potential impacts to populations of laughing gulls has been and is expected to continue to be insignificant to the overall viability and reproductive success of this bird species population on a local, regional, and nationwide scale.

4.1.1.2 Alternative 2 - Non-lethal GDM Only By WS

Under this alternative, WS would not take any target species because no lethal methods would be used. Although WS' lethal take of ring-billed gulls, herring gulls, great black-backed gulls, and laughing gulls would not occur, it is likely that, without WS conducting some level of lethal GDM activities for these species; private GDM efforts would increase, leading to potentially similar or even greater effects on target species populations than those of the current program alternative. For the same reasons shown in the population effects analysis in section 4.1.1.1, however, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. Effects and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 3, but less than Alternative 4.

4.1.1.3 Alternative 3 - Technical Assistance Only

Under this alternative, WS would have no impact on any gull species in the State because the program would not conduct any operational GDM activities but would be limited to providing advice only. Private efforts to reduce or prevent bird damage and perceived disease transmission risks could increase which could result in similar or even greater effects on those populations than the current program alternative. For the same reasons shown in the population effects analysis in section 4.1.1.1, however, it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations. Effects 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 - No WS GDM Program

Under this alternative, WS would have no impact on any gull species populations in the State. Private efforts to reduce or prevent depredations could increase which could result in effects on target species populations to an unknown degree. Effects on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by private persons. For the same reasons shown in the population effects analysis in section 4.1.1.1 it is unlikely that target bird populations would be adversely impacted by implementation of this alternative. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of other chemicals which could lead to real but unknown effects on target bird populations.

4.1.2 Issue 2 - Effects on Other Wildlife Species, Including T&E Species

4.1.2.1 Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

Adverse Effects on Non-target (non-T&E) Species. Direct impacts on non-target species occur when WS' inadvertently kill, injure, or harass animals that are not target species. In general, these impacts result from the use of methods that are not completely selective for target species. Non-target migratory bird species and other non-target wildlife species are usually not affected by WS' management methods, except for the occasional scaring from harassment devices. In these cases, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action. No WS' take of non-target species during GDM activities has occurred in Rhode Island and take of non-target species should not increase substantially in the future.

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

Beneficial Effects on Non-target Species. Programs to control gull damage can benefit many other wildlife species that are impacted by their predation or competition for habitat. Gulls are generally very aggressive nesting area colonizers and will force other species such as terns and plovers from prime nesting areas. Great black-backed gulls are especially aggressive and will kill young terns and other birds. This alternative has the greatest possibility of successfully reducing gull damage and conflicts to wildlife species since all GDM methods could possibly be implemented or recommended by WS.

T&E Species Effects. T&E species that are federally listed by the USFWS for the State of Rhode Island are presented in Appendix C.

WS has reviewed the list of T&E species for Rhode Island and has determined that the proposed gull GDM program will not adversely affect federally or state listed species in Rhode Island (see Appendix C). This determination is based on the conclusions made by the USFWS during their 1992 programmatic consultation of WS' activites and subsequent BO (USDA 1997). The USFWS determined that the management activities being utilized for WS' gull damage management are not likely to adversely affect those listed species addressed in WS' programmatic FEIS. WS has determined that the use of gull damage management methods will have no effect on those T&E species not included in the 1992 Biological Opinion or their critical habitats. WS has also determined that the use of alpha-chloralose and lasers will have no effect on any listed T&E species. Furthermore, the 1992 BO from the USFWS determined that no fish, clams, crustaceans, or plants would be adversely affected by any aspect of the WS program.

In some instances, WS' gull damage management activities may have a beneficial impact on threatened and endangered species, either intentionally or unintentionally. Examples of beneficial

impacts include reductions in predation, nest site competion, habitat degredation, and the spread of wildlife diseases such as avian influenza and West Nile virus. WS' does not currently conducted activities to reduce predation on or competion with any T&E species associated with gulls in Rhode Island. If such activities are requested of WS, consultation with the USFWS prior to the start of those actions would occur to ensure those activities would not adversely affect T&E species.

Mitigation measures to avoid T&E effects were described in Chapter 3.

4.1.2.2 Alternative 2 - Non-lethal GDM Only By WS

Adverse Effects on Non-target Species
Under this alternative, WS' take of non-target animals would probably be less than that of the proposed action because no lethal control actions would be taken by WS. However, non-target take would not differ substantially from the current program because the current program takes very few non-target animals. No non-targets have been taken by WS while conducting GDM activities. Non-target migratory bird species and other non-target wildlife species are usually not affected by WSs management methods, except for the occasional scaring from harassment devices. In these cases, migratory birds and other affected non-target wildlife may temporarily leave the immediate vicinity of scaring, but would most likely return after conclusion of the action.

People whose bird damage problems were not effectively resolved by non-lethal control methods would likely resort to other means of legal or illegal lethal control. This could result in less experienced persons implementing control methods and could lead to greater take of non-target wildlife than the proposed action. For example, shooting by persons not proficient at bird identification could lead to killing of non-target birds. It is hypothetically possible that frustration caused by the inability to reduce damage and associated losses could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including T&E species. Hazards to raptors, including bald eagles and falcons, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Beneficial Effects on Non-target Species
This alternative would reduce negative impacts caused by gulls to wildlife species and their habitats, including T&E species, if non-lethal methods were effective in reducing such damage to acceptable levels. If non-lethal methods were ineffective at reducing damage to acceptable levels, WS would not be available to conduct or provide advice on any other types of control methods. In these situations it would be expected that gull damage to wildlife species and their habitats would likely remain the same or possibly increase dependent upon actions taken by the affected resource owner or landowner.

4.1.2.3 Alternative 3 - Technical Assistance Only

Adverse Effects on Non-target Species
Alternative 3 would not allow any direct operational GDM by WS in Rhode Island. There would be no impact on non-target or T&E species by WS' activities from this alternative. Technical assistance or self-help information would be provided at the request of producers and others. Although technical support might lead to more selective use of control methods by private parties than that which might occur under Alternative 2, private efforts to reduce or prevent depredations could still result in less experienced persons implementing control methods leading to greater take of non-target wildlife than under the proposed action. It is hypothetically possible that, similar to Alternative 2, frustration could lead to illegal use of chemical toxicants which could lead to unknown effects on local non-target species populations, including some T&E species. Hazards to raptors, including bald eagles, could therefore be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used by frustrated private individuals.

Beneficial Effects on Non-target Species
The ability to reduce negative impacts caused by gulls to wildlife species and their habitats, including T&E species, would be variable based upon the skills and abilities of the person implementing control actions. It would be expected that this alternative would have a greater chance of reducing damage than alternative 4 since WS would be available to provide information and advice.

4.1.2.4 Alternative 4 - No WS GDM Program

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

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

4.1.3 Issue 3 - Effects on Human Health and Safety

4.1.3.1 Safety and Efficacy of Chemical Control Methods

Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

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

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

- It is readily broken down or metabolized into removable compounds that are excreted in urine in the target species (EXTOXNET 1996). Therefore, little of the chemical remains in killed birds to present a hazard to humans.
- A human would need to ingest the internal organs of birds found dead from Avitrol ingestion to have any chance of receiving even a minute amount of the chemical or its metabolites into their system. This is highly unlikely to occur. Furthermore, secondary hazard studies with mammals and birds have shown that there is virtually no hazard of secondary poisoning.
- Although Avitrol has not been specifically tested as a cancer-causing agent, the chemical was found not to be mutagenic in bacterial organisms (EPA 1997). Therefore, the best scientific information available indicates it is not a carcinogen. Notwithstanding, the extremely controlled and limited circumstances in which Avitrol is used would prevent exposure of members of the public to this chemical.

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

DRC-1339 (3-chloro-p-toluidine hydrochloride). DRC-1339 is a lethal chemical method that could be used for bird control should it become registered in Rhode Island in the future. There has been some concern expressed by a few members of the public that unknown but significant risks to human health may exist from DRC-1339 used for GDM.

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

- Its use is prohibited within 50 feet of standing water and cannot be applied directly to food or feed crops (contrary to some misconceptions, DRC-1339 is not applied to feed materials that livestock can feed upon).
- DRC-1339 is highly unstable and degrades rapidly when exposed to sunlight, heat, or ultraviolet radiation. The half-life is about 25 hours; in general, treated bait material is nearly 100% broken down within a week.
- It is more than 90% metabolized in target birds within the first few hours after they consume the bait. Therefore, little material is left in bird carcasses that may be found or retrieved by people.
- Application rates are extremely low (less than 0.1 lb. of active ingredient per acre) (EPA 1995).
- A human would need to ingest the internal organs of birds found dead from DRC-1339 to have any chance of receiving even a minute amount of the chemical or its metabolites into his/her system. This is highly unlikely to occur.
- The EPA has concluded that, based on mutagenicity (the tendency to cause gene mutations in cells), this chemical is not a mutagen or a carcinogen (i.e., cancer-causing agent) (EPA 1995). Regardless, however, the extremely controlled and limited circumstances in which DRC-1339 is used would prevent any exposure of the public to this chemical.

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

Other GDM Chemicals. Other non-lethal GDM chemicals that might be used or recommended by WS would include repellents such as methyl or di-methyl anthranilate (artificial grape flavoring used in foods and soft drinks sold for human consumption), which has been used as an area repellent, anthraquinone (should it become registered in Rhode Island) which is presently marketed as Flight Control™, and the tranquilizer Alpha-Chloralose (should it become registered in Rhode Island). Such chemicals must undergo rigorous testing and research to prove safety, effectiveness, and low environmental risks before EPA or FDA would register them. Any operational use of chemical repellents would be in accordance with labeling requirements under FIFRA and State pesticide laws and regulations which are established to avoid unreasonable adverse effects on the environment.

Following labeling requirements and use restrictions are a built-in mitigation measure that would assure that use of registered chemical products would avoid significant adverse effects on human health. Based on a thorough Risk Assessment, APHIS concluded that, when WS' program chemical methods are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible effects on the environment (USDA 1997).

Alternative 2 - Non-lethal GDM Only By WS

Alternative 2 would not allow the use of any lethal methods in the State. Similar to the proposed action, WS would only use or recommend non-lethal GDM chemicals. Therefore, WS' impacts of this alternative would be similar to the proposed action for those non-lethal chemicals.

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

Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any direct operational GDM assistance by WS in the State. WS would only provide advice and, in some cases, equipment or materials (i.e., by loan or sale) to other persons who would then conduct their own damage management actions. Concerns about human health risks from WS' use of chemical GDM methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase in the absence of direct assistance, resulting in less experienced persons implementing chemical damage management methods and leading to a greater risk than the proposed action alternative. However, because some of these private parties would be receiving advice and instruction from WS, concerns about human health risks from chemical GDM methods use should be less than those concerns under Alternative 4.

Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS' assistance. Use of Avitrol in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this alternative if chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants, and could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the proposed alternative.

Alternative 4 - No Federal WS Bird Damage Management

Alternative 4 would not allow any WS GDM in the State. Concerns about human health risks from WS' use of chemical GDM methods would be alleviated because no such use would occur. Private efforts to reduce or prevent damage would be expected to increase in the absence of direct assistance, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative.

Commercial pest control services would be able to use Avitrol and such use would likely occur to a greater extent in the absence of WS' assistance. Use of Avitrol in accordance with label requirements should preclude any hazard to members of the public. However, hazards to humans and pets could be greater under this alternative if other chemicals that are less selective or that cause secondary poisoning are used. It is hypothetically possible that frustration caused by the inability to alleviate bird damage could lead to illegal use of certain toxicants, and could pose secondary poisoning hazards to pets and to mammalian and avian scavengers. Some chemicals that could be used illegally would present greater risks of adverse effects on humans than those used under the current program alternative.

4.1.3.2 Effects on Human Health and Safety from Non-Chemical GDM Methods

Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

Non-chemical GDM methods that might raise safety concerns include shooting with firearms and harassment with pyrotechnics. Firearms are only used by WS' personnel who are experienced in handling and using them and are trained in the safe handling according to WS' directives. WS'

personnel receive safety training on a periodic basis to keep them aware of safety concerns. The Rhode Island WS program has had no accidents involving the use of firearms or pyrotechnics in which a member of the public was harmed. A formal risk assessment of WS' operational management methods found that risks to human safety were low (USDA 1997). Therefore, no adverse effects on human safety from WS' use of these methods are expected.

Alternative 2 - Non-lethal Bird Damage Management Only By WS

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

Alternative 3 - Technical Assistance Only

Under this alternative, WS would not engage in direct operational use of any non-chemical GDM methods. Risks to human safety from WS' use of firearms and pyrotechnics would hypothetically be lower than the current program alternative, but not significantly because WS' current program in Rhode Island has an excellent safety record in which no accidents involving the use of these devices have occurred that have resulted in a member of the public being harmed.

Commercial pest control services would be able to use pyrotechnics or firearms in GDM programs and this activity would likely occur to a greater extent in the absence of WS' direct assistance. Hazards to humans and property could be greater under this alternative if personnel conducting GDM activities using non-chemical methods are poorly or improperly trained. Since WS would be available to provide advice and information on the safe and proper use of these methods adverse impacts should be less than Alternative 4.

Alternative 4 - No WS GDM Program

Alternative 4 would not allow any WS GDM in the State. Concerns about human health risks from WS' use of non-chemical GDM methods would be alleviated because no such use would occur. The use of firearms or pyrotechnics by WS would not occur in GDM activities in the State.

However, private efforts to reduce or prevent damage would be expected to increase, resulting in less experienced persons implementing damage management methods and potentially leading to greater risk to human health and safety than the proposed action alternative. Commercial pest control services would be able to use pyrotechnics or firearms in GDM programs and this activity would likely occur to a greater extent in the absence of WS's assistance. Hazards to humans and property could be greater under this alternative if personnel conducting GDM activities using non-chemical methods are poorly or improperly trained.

4.1.3.3 Effects on Human Health and Safety from Not Conducting GDM

Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

This alternative has the greatest possibility of successfully reducing gull damage and conflicts since all GDM methods could possibly be implemented or recommended by WS. An integrated GDM program reduces damage or threats to public health or safety to people who would have no relief from such damage or threats if non-lethal methods were ineffective or impractical. As discussed in Chapter 1, birds are a threat to aviation safety and can carry or be involved in the

cycle of diseases that are transmittable to humans and that can adversely affect human health. While WS may conduct collaborative activities that help examine disease issues in most cases, it is difficult to conclusively prove that the birds were responsible for transmission of individual human cases or outbreaks of bird-borne diseases. Nonetheless, certain requesters of GDM service may consider this risk to be unacceptable and may request such service primarily for that reason. In such cases, GDM, either by lethal or non-lethal means, would, if successful, reduce the risk of bird-borne disease transmission at the site for which GDM is requested.

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

Alternative 2 - Non-lethal GDM Only By WS

This alternative would reduce negative impacts caused by gulls to human health and safety if non-lethal methods were effective in reducing such damage to acceptable levels. If non-lethal methods were ineffective WS would not be available to conduct or provide advice on any other types of control methods. In these situations it would be expected that gull impacts to human health and safety would likely remain the same or possibly increase dependent upon actions taken by the affected resource or land owner.

Under this alternative, WS would be restricted to implementing or recommending only non-lethal methods in providing assistance with gull damage problems. Entities requesting GDM assistance for human health concerns would only be provided information on non-lethal barriers or exclusion devices, habitat alteration, nest and egg destruction, harassment methods, or other available non-lethal methods. Because some of these non-lethal methods would likely be effective at the individual sites where they are used, this alternative could create or increase human health risks at other locations to where the birds would then move. Some requesting entities such as city government officials would reject WS' assistance for this reason and would likely seek to achieve bird control by other means. In such cases, human health risks may remain the same or become worse. Also, under this alternative, human health problems would probably increase if private individuals were unwilling to implement non-lethal control methods because of high cost or if non-lethal methods were ineffective at reducing damage to acceptable levels and they were unable to hire other entities to conduct lethal GDM for human health concerns.

Alternative 3 - Technical Assistance Only

With WS' technical assistance but no direct operational assistance, entities requesting GDM for human health and safety concerns would either (1) not take any action which means the risk of human health problems might continue or increase in each situation as the gull populations are maintained or increased, (2) implement WS' lethal and non-lethal recommendations which could result in birds relocating to other areas, and thereby creating or increasing human health risks at new sites, or (3) hire private pest control operators to conduct control activities. Under this alternative, human health problems could increase if private individuals were unable to achieve effective GDM with technical assistance alone, or if they were unable to hire other entities to conduct effective GDM for human health concerns. It would be expected that this alternative would have a greater chance of reducing human health and safety concerns than alternative 4 since WS would be available to provide information and advice.

Alternative 4 - No Federal WS GDM

With no WS' assistance, private individuals and community government officials would either (1)

not take any action, which means the risk of human health problems would remain or would increase in each situation as gull populations are maintained or increased, (2) implement their own lethal and non-lethal GDM program, which could result in birds relocating to other areas, and thereby creating or increasing human health risks at new sites, or (3) hire private pest control operators to conduct control activities. Under this alternative, human health problems could remain the same or increase if private individuals were unable to find and implement effective means of controlling gull damage.

4.1.4 Issue 4 - Effects on Socio-economics and Economics of the Human Environment

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

Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

Under the proposed action, methods would be employed that would result in the dispersal, exclusion, or removal of individuals or small groups of gulls to resolve damage and threats associated with those gulls in Rhode Island. In some instances where gulls are dispersed or removed, the ability of interested persons to observe and enjoy gulls will likely temporarily decline. However, the gull populations in those areas will likely increase upon cessation of damage management activities.

Even the use of exclusionary devices can lead to dispersal of wildlife if the resource being damaged was acting as an attractant. Thus, once the attractant has been removed or made unavailable, the wildlife will likely disperse to other areas where resources are more vulnerable.

The use of lethal methods would result in temporary declines in local populations resulting from the removal of gulls to address or prevent damage and threats. The goal under the proposed action is to respond to requests for assistance and to manage those gulls responsible for the resulting damage. Therefore, the ability to view and enjoy gulls in Rhode Island will still remain if a reasonable effort is made to locate gulls outside the area in which damage management activities occurred.

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

Some people have been opposed to the killing of any birds during GDM activities. Under the current program, some lethal control of birds would continue and these persons would continue to be opposed. However, many persons who voice their opposition have no direct connection or opportunity to view or enjoy the particular birds that would be killed by WS' lethal control activities. Lethal control actions would generally be restricted to local sites where damage or threats were occurring. Therefore, the species subjected to limited lethal control actions would remain common and abundant, therefore continuing to remain available for viewing by persons with that interest. Lethal removal of birds from airports should not affect the public's enjoyment of the aesthetics of the environment since airport properties are closed to public access. The abilities to view and interact with birds at these sites are usually either restricted to viewing from a location outside boundary fences or forbidden.

Alternative 2 - Non-lethal GDM Only By WS

Under this alternative, WS would not conduct any lethal GDM but would still conduct non-lethal GDM methods, such as nest and egg destruction and harassment of birds that were causing damage. Some people who oppose lethal control of wildlife but are tolerant of non-

lethal wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by the death of individual birds under this alternative, but might oppose dispersal or translocation of certain birds. The abundant populations of the target bird species in urban environments would enable people to continue to view them and to establish affectionate bonds with individual wild birds. Although WS would not perform any lethal activities under this alternative, other private entities would likely conduct GDM activities similar to those no longer conducted by WS; the effects would then be similar to the proposed action alternative.

Alternative 3 - Technical Assistance Only

Under this alternative, WS would not conduct any direct operational GDM but would still provide technical assistance or self-help advice to persons requesting assistance with bird damage. Some people who oppose direct operational assistance in wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS' activities under this alternative because the individual birds would not be killed by WS. However, other private entities would likely conduct GDM activities similar to those no longer conducted by WS; the effects would then be similar to the proposed action alternative.

Alternative 4 - No Federal WS GDM

Under this alternative, WS would not conduct any lethal removal of birds nor would the program conduct any nest and egg destruction or harassment of birds. Some people who oppose any wildlife damage management would favor this alternative. Persons who have developed affectionate bonds with individual wild birds would not be affected by WS' activities under this alternative. However, other private entities would likely conduct GDM activities similar to those no longer conducted by WS; the effects would then be similar to the proposed action alternative.

4.1.4.2 Effects on Aesthetic and Value of Property Damaged by Birds

Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

This alternative has the greatest possibility of successfully reducing gull damage and conflicts since all GDM methods could possibly be implemented or recommended by WS. Under this alternative, operational assistance in reducing bird problems, in which droppings from the birds cause unsightly messes, would improve aesthetic values of affected properties.

Dispersal or moving nuisance roosting or nesting populations of birds by harassment can sometimes result in the birds causing the same or similar problems at another location. If WS is providing direct operational assistance in relocating such birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

In some instances, large roosting or nesting populations of birds can destroy habitat and displace other nesting birds, reducing the aesthetic value for many. This alternative has the greatest possibility of successfully reducing such damage and conflicts since all GDM methods could possibly be implemented or recommended by WS.

Alternative 2 - Non-lethal Bird Damage Management Only By WS

This alternative would reduce the negative impacts caused by gulls to the aesthetic values of property if non-lethal methods were effective in reducing such damage to acceptable levels. If non-lethal methods were ineffective WS would not be available to conduct or provide advice on any other types of control methods. In these situations it would be expected that negative impacts

caused by gulls would likely remain the same or possibly increase dependent upon actions taken by the affected resource or land owner.

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

Dispersing or moving nuisance roosting or nesting populations of birds by harassment or exclusion can sometimes result in the birds causing the same or similar problems at the new location. If WS is providing direct operational assistance in moving such birds, coordination with local authorities who may assist in monitoring the birds' movements is generally conducted to assure they do not reestablish in other undesirable locations.

Alternative 3 - Technical Assistance Only

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

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

Alternative 4 - No Federal WS Bird Damage Management

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

Moving nuisance roosting or nesting population of birds through harassment, barriers, or habitat alteration can sometimes result in the birds causing the same problems at the new location. Coordination of dispersal activities by local residents or municipal authorities with local authorities to monitor the birds' movements to assure the birds do not reestablish in other undesirable locations might not be conducted; therefore the potential of adverse effects to nearby property owners is increased.

4.1.5 Issue 5 - Humaneness and Animal Welfare Concerns of the Methods Used

4.1.5.1 Alternative 1 - Integrated GDM Program (Proposed Action/No Action)

Under this alternative, methods viewed by some persons as inhumane would be used in GDM by WS. These methods would include shooting and chemicals such as Avitrol.

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

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

If registered in the future in Rhode Island, DRC-1339 could be included in GDM. This chemical causes a quiet and apparently painless death which results from uremic poisoning and congestion of major organs (Decino et al. 1966). The birds become listless and lethargic, and a quiet death normally occurs in 24 to 72 hours following ingestion. This method appears to result in a less stressful death compared to most natural causes; which are primarily disease, starvation, and predation. For these reasons, WS might consider DRC-1339 use, following registration in Rhode Island, to be a relatively humane method of lethal GDM. However, despite the apparent painlessness of the effects of this chemical, some persons will view any method that takes a number of hours to cause death as inhumane and unacceptable.

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

4.1.5.2 Alternative 2 - Non-lethal GDM Only By WS

Under this alternative, lethal methods viewed as inhumane by some persons would not be used by WS. WS could use and recommend non-lethal chemicals such as Avitrol, which is intended as a dispersing agent, causing bird that ingest treated particles to become hyperactive (see discussion in Appendix B). Their distress calls generally alarm the other birds and cause them to leave the site. Only a small number of birds need to be affected to cause alarm in the rest of the flock. The affected birds generally die. In most cases where Avitrol is used, only a small percentage of the birds are affected and killed by the chemical with the rest being merely dispersed. In experiments to determine suffering, stress, or pain in affected animals Rowsell et al. (1979) tested Avitrol on pigeons and observed subjects for clinical, pathological, or neural changes indicative of pain or distress. None were observed. Conclusions of the study were that the chemical met the criteria for a humane pesticide. Notwithstanding, some persons would view Avitrol as inhumane treatment of the birds that are affected by it based on the birds' distress-like behavior.

Shooting, live trapping/capture and euthanization by cervical dislocation or CO_2 gas could be used by non-WS entities and, similar to the current program alternative, would be viewed by some persons as inhumane.

4.1.5.3 Alternative 3 - Technical Assistance Only

Under this alternative, WS would not conduct any lethal or non-lethal GDM, but would provide self-help advice only. Thus, lethal methods viewed as inhumane by some persons would not be used by WS. Without WS' direct operational assistance, it is expected that many requesters of GDM would reject non-lethal recommendations or would not be willing to pay the extra cost of implementing and maintaining them and would seek alternative lethal means. Similar to Alternative 2, Avitrol, shooting, live trapping/capture and euthanization by

cervical dislocation or CO_2 gas would be available for private use and would be viewed by some persons as inhumane.

4.1.5.4 Alternative 4 - No WS GDM Program

Under this alternative, methods viewed as inhumane by some persons would not be used by WS. Similar to Alternative 2 and 3, shooting, Avitrol, live trapping/capture and euthanasia by cervical dislocation or CO_2 gas could be used by other entities and would be viewed by some persons as inhumane.

4.2 CUMULATIVE IMPACTS

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

Under Alternatives 1, 2 and 3, WS would address damage associated with gulls in a number of situations throughout the State. The WS GDM program would be the primary federal program with GDM responsibilities; however, some state and local government agencies may conduct GDM activities in Rhode Island, as well. Through ongoing coordination with these agencies, WS is aware of such GDM activities and may provide technical assistance in such efforts. WS does not normally conduct direct damage management activities concurrently with such agencies in the same area, but may conduct GDM activities at adjacent sites within the same time frame. In addition, commercial pest control companies may conduct GDM activities in the same area. The potential cumulative impacts analyzed below could occur either as a result of WS GDM program activities over time, or as a result of the aggregate effects of those activities combined with the activities of other agencies and individuals. WS coordination and collaboration with the USFWS when addressing migratory bird issues in Rhode Island ensures all reported take of gulls is analyzed and considered when conducting GDM activities.

Cumulative Impacts on Wildlife Populations

Methods used or recommended by the WS program in Rhode Island will likely have no cumulative adverse effects on target and non-target wildlife populations. Population trend data indicate that target bird populations have remained relatively stable or increasing for Rhode Island, the region, and across the United States. WS will continue to coordinate and collaborate with the USFWS on GDM activities to ensure cumulative take of gull species from all known sources are considered as part of management plans and population objectives for gulls. WS' will annually monitor take, including take from other sources, to ensure WS' actions are not having cumulative impacts on gull populations. When methods are employed according to the labels or used an intented to manage gull damage, those methods will have no cumulative impact on non-target species. No non-targets have been taken by WS from GDM activities previously. WS' implementation of mitigating measures and SOPs, will ensure take of non-targets is minimal. WS will annually monitor non-target take and analyze activities to ensure no adverse impact to non-targets are occurring.

Evaluation of GDM program activities relative to target, non-target, and T&E species indicated that program activities will likely have no cumulative adverse effects on wildlife populations in Rhode Island. GDM program actions would be occurring simultaneously, over time, with other natural processes and human generated changes that are currently taking place. Those activities include, but are not limited to: 1) Natural mortality of target, non-target, and T&E species, 2) human-induced mortality of target and non-target species, 3) human and naturally induced alterations of wildlife habitat, and 4) annual and perennial cycles in wildlife population densities.

All these factors play a role in the dynamics of wildlife populations. In many circumstances, GDM is necessary to reduce damage when some or all of those elements have contrived to elevate target species populations or place target species at a juncture to cause damage to resources. WS' actions taken to

minimize or eliminate damage are constrained as to scope, duration and intensity, for the purpose of minimizing or avoiding impacts to the environment. WS evaluates damage occurring, including other affected elements and the dynamics of the damaging species; determines appropriate strategies to minimize effects on environmental elements; applies damage management actions; and subsequently monitors and adjusts/ceases damage management actions (Slate et al. 1992). This process allows WS to take into consideration other influences in the environment, such as those listed above, in order to avoid cumulative adverse impacts on target, non-target, and T&E species.

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

1. Historical outcomes of WS' GDM programs on wildlife

No cumulative adverse affects have been identified for target, non-target, and T&E species identified in this EA as a result of GDM program activities implemented over time.

2. SOP and mitigation strategies built into WS' MDM program

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

3. Current status of potentially affected wildlife species

Natural and human-induced mortality patterns for target, non-target, and T&E species are expected to remain essentially unchanged in Rhode Island. This is true of elements outside WS' GDM conducted programs and the programs themselves. As a result, no cumulative adverse affects are expected from repetitive GDM programs over time in the fairly static set of conditions currently affecting wildlife in Rhode Island.

Cumulative Impact Potential from Chemical Components

GDM programs which includes the use of chemicals may have the greatest potential for cumulative impacts on the environment as such impacts relate to deposit of chemical residues in the physical environment and environmental toxicosis. The frightening agent, Avitrol, is a chemical method currently used or recommended by the Rhode Island WS GDM program for the purpose of dispersing gulls. Another possible chemical that may be used by WS in the future if it becomes registered for use in Rhode Island is the avicide, DRC-1339. Both of these chemicals have been evaluated for possible residual effects which might occur from buildup of the chemicals in soil, water, or other environmental sites.

Avitrol may be used or recommended by the Rhode Island WS program. Most applications would not be in contact with soil, applications would not be in contact with surface or ground water, and uneaten baits will be recovered and disposed of according to EPA label specifications. Avitrol exhibits a high persistence in soil and water but, according to literature, does not bioaccumulate (USDA 1997, EXTOXNET 1996). Because of Avitrol's characteristic of binding to soils, it is not expected to be present in surface or ground water as a result of its use on land (EPA 1980). A combination of chemical characteristics and baiting procedures used by WS would reduce the likelihood of environmental accumulation of Avitrol. The EPA has not required studies on the fate of Avitrol in the soil because, based on use patterns of the avicide, soil residues are expected to be low (EPA 1980).

DRC-1339 exhibits a low persistence in soil or water, and bioaccumulation of the chemical is unlikely (USDA 1997). Additionally, the relatively small quantity of DRC-1339 that could potentially be used in GDM programs in Rhode Island, the chemical's instability which results in degradation of the

product, and application protocol used in WS' programs further reduces the likelihood of any environmental accumulation.

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

Non-lethal chemicals may also be used or recommended by the WS GDM program in Rhode Island. Characteristics of these chemicals and potential use patterns indicate that no significant cumulative impacts related to environmental fate are expected from their use in WS GDM programs in Rhode Island. Non-lethal repellents when used according to lable requirements are not expected to have any adverse cumulative impacts since those factors that contribute to accumulation are considered in the registration of those chemicals with EPA.

Cumulative Impact Potential from Non-chemical Components

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

Because shooting may be considered as a component of the non-chemical, the deposition of shot in the environment is a factor considered in this EA. A condition of the depredation permit requires that non-toxic shot be used in the taking of birds under the permit. Therefore, accumulations of lead shot from WS' GDM activities will not occur.

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

All other non-chemical GDM methods, such as trapping, harassment methods, cannon nets, mist nets, are used within a limited time frame, are not residual, and do not possess properties capable of inducing cumulative adverse impacts.

Cummulative Impact Potential on the Socio-cultural and Economics of the Human Environment

Five aspects of this issue have been identified in this EA which include: 1) possible disruption of human affectionate-bonds which some people develop with individual wildlife, 2) possible decrease in aesthetic enjoyment which some people gain by feeding, and viewing gulls, 3) decrease in aesthetic enjoyment of gulls experienced by some people as a result of overabundant populatins, and 5) degradation or loss of value of properties by some people as a result of the gull damage.

In the wild, few animals in the United States have life spans approaching that of humans. Mortality is high among wildlife populations and specific individuals among a species may experience death early in life. This is a natural occurrence and humans who form affectionate bonds with animals experience loss of those animals over time in most instances. A number of professionals in the field of psychology have studied human behavior in response to attachment to pet animals (Gerwolls and Labott 1994, Marks and Koepke 1994, Zasloff 1996, Archer 1999, Ross and Baron-Sorensen 1998, Meyers, 2000). Similar observations are probably applicable to close bonds which could exist between people and wild animals. As observed by researchers in human behavior, normal human responses to loss of loved ones proceed through phases of shock or emotional numbness, sense of loss, grief, acceptance of the loss or what cannot be changed, healing, and acceptance and rebuilding which leads to resumption of normal lives (Lefrancois 1999). Those who lose companion animals, or animals for which they may have developed a bond and affection,

are observed to proceed through the same phases as with the loss of human companions (Gerwolls and Labott 1994, Boyce 1998, Meyers 2000). However, they usually establish a bond with other individual animals after such losses. Although they may lose the sense of enjoyment and meaning from the association with those animals which die or are no longer accessible, they usually find a similar meaningfulness by establishing an association with new individual animals or through other relational activities (Weisman 1991). Through this process of coping with the loss and establishing new affectionate bonds, people may avoid compounding emotional effects resulting from such losses (Parkes 1979, Lefrancois 1999).

Some gulls with which humans have established affectionate bonds may be removed from some project sites by WS. However, other individuals of the same species would likely continue to be present in the affected area and people would tend to establish new bonds with those remaining gulsl. In addition, human behavior processes usually result in individuals ultimately returning to normalcy after experiencing the loss of association with a wild animal which might be removed from a specific location. WS' activities are not expected to have any cumulative adverse affects on this element of the human environment.

Those who enjoy viewing wildlife may experience a temporary reduction in being able to view wildlife at some sites where WS' program activities are implemented. However, other individuals of the same species would likely continue to be present in the affected area, and would also likely be available for viewing and enjoyment at adjacent locations.

Some people experience a decrease in aesthetic enjoyment of wildlife because they feel that overabundant species are objectionable and interfere with their enjoyment of wildlife in general or that damage cause by those wildlife decreases opportunity of economic gain. Continued increases in numbers of individuals or the continued presence of an overabundant species may lead to further degradation of some people's enjoyment of any wildlife. WS' GDM actions could positively affect the aesthetic enjoyment of wildlife for those people that are being adversely affected by the target species identified in this EA. Based on WS' activities targeting those birds responsible for causing damage, cumulative impacts from management activities will not prevent those interested in enjoying gulls since populations will still remain in the area for viewing and enjoying outside of the area where damage was occurring. WS' activities are not expected to have any cumulative adverse affects on this element of the human environment.

Cumulative Impacts on Humaneness and Animal Welfare Concerns of Methods used by WS

WS continues to seek new methods and ways to improve current technology to improve humaneness of methods used to manage damage caused by gulls. Cooperation with individuals and organizations involved in animal welfare continues to be an agency priority for the purpose of evaluating strategies and defining research aimed at developing GDM methods. WS continues to develop and implement more humane methods as technology advances, and also makes this information available to non-WS entities. WS implements methods as humanely as possible to minimize pain and stress. No cumulative adverse affects from WS' activities are expected in relation to this element of the human environment.

SUMMARY

No significant cumulative environmental impacts are expected from any of the 4 alternatives. Under the proposed action, the lethal removal of birds by WS would not have a significant impact on overall gull populations in Rhode Island, but some local reductions may occur. No risk to public safety is expected when WS' services are provided and accepted by requesting individuals in Alternatives 1, 2, and 3, since only trained and experienced wildlife biologists/specialists would conduct and recommend GDM activities. There is a slight increased risk to public safety when persons who reject WS' assistance and recommendations in Alternatives 1, 2 and 3 and conduct their own GDM activities, and when no WS assistance is provided in Alternative 4. In all 4 Alternatives, however, it would not be to the point that the impacts would be significant. Although some persons will likely be opposed to WS' participation in GDM activities on public and private lands within the state of Rhode Island, the analysis in this EA indicates that WS Integrated GDM program will not result in significant cumulative adverse impacts on the quality of the human environment. Table 4-11 summarizes the expected impact of each of the alternatives on each of the

issues.

Table 4-11 Summary of expected effects of each of the alternatives on the major issues.

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

CHAPTER 5: LIST OF PREPARERS, CONSULTANTS, AND REVIEWERS

5.0 LIST OF PREPARERS AND REVIEWERS

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APPENDIX A

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APPENDIX B

GDM METHODS AVAILABLE FOR USE OR RECOMMENDATION BY THE RI WS PROGRAM

NON-LETHAL METHODS - NONCHEMICAL

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

> **Cultural methods** include altering planting dates so that crops are not as vulnerable to damage when the damage-causing species is present, or the planting of crops that are less attractive or less vulnerable to such species. Cultural methods also include locating resources damaged by birds away from roosting, nesting, feeding or loafing areas. At feedlots or dairies, cultural methods generally involve modifications to the level of care or attention given to livestock which may vary depending on the age and size of the livestock. Animal husbandry practices include but are not limited to techniques such as night feeding, indoor feeding, closed barns, removal of spilled grain or standing water, and use of bird proof feeders (Johnson and Glahn 1994).
>
> **Environmental/Habitat modification** can be an integral part of GDM. Wildlife production and/or presence are directly related to the type, quality, and quantity of suitable habitat. Therefore, habitat can be managed to reduce or eliminate the production or attraction of certain bird species or to repel certain birds. In most cases, the resource or property owner is responsible for implementing habitat modifications, and WS only provides advice on the type of modifications that have the best chance of achieving the desired effect. Habitat management is most often a primary component of GDM strategies at or near airports to reduce bird aircraft strike problems by eliminating bird nesting, roosting, loafing, or feeding sites. Generally, many bird problems on airport or other properties can be minimized through management of vegetation and water from areas adjacent to aircraft runways or the resource to be protected.

Animal behavior modification. This refers to tactics that alter the behavior of wildlife to reduce damage. Animal behavior modification may involve use of scare tactics or grid wires to deter or repel animals that cause loss or damage (Twedt and Glahn 1982). Some but not all methods that are included by this category are:

- Bird-proof barriers
- Electronic guards
- Propane exploders
- Pyrotechnics
- Distress Calls and sound producing devices
- Chemical frightening agents
- Taste or odor repellents
- Scare crows
- Mylar tape
- Eye-spot balloons
- Lasers

These techniques are generally only practical for small areas. Scaring devices such as distress calls, helium filled eye spot balloons, raptor effigies and silhouettes, mirrors, and moving disks can be effective but usually for only a short time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Graves and Andelt 1987, Mott 1985, Shirota and Misake 1983, Conover 1982, Arhart 1972). Mylar tape and flagging has produced mixed results in its effectiveness to frighten birds (Belant and Ickes 1997, Dolbeer et al. 1986, Tobin et al. 1988). Generally, scaring devices that affect more than one of the birds' senses are more

effective. Mylar tape and flagging have both visual and auditory components that have better repellency.

Bird proof barriers can be effective but are often cost-prohibitive, particularly because of the aerial mobility of birds which requires overhead barriers as well as peripheral fencing or netting. Exclusion adequate to stop bird movements can also restrict movements of livestock, people, and other wildlife (Fuller-Perrine and Tobin 1993). Overhead wire grids can deter gulls from nesting, loafing, and feeding areas (Blokpoel and Tessier 1984, Belant and Ickes 1996, Dolbeer et al. 1988). The birds apparently fear colliding with the wires and thus avoid flying into areas where the method has been employed.

Netting can be used to exclude birds from a specific area by the placement of bird proof netting over and around the specific resource to be protected. Exclusion may be impractical in some settings (e.g., commercial agriculture); however, it can be practical in small areas (e.g., personal gardens) or for high-value crops (e.g., grapes). Although this alternative would provide short-term relief from damage, it may not completely deter birds from feeding, loafing, staging, or roosting at that site. A few people would find exclusionary devices such as netting unsightly, trashy, and a lowering of the aesthetic value of the neighborhood when used over personal gardens.

Auditory scaring devices such as propane exploders, pyrotechnics, electronic guards, scare crows, and audio distress/predator vocalizations are effective in many situations for dispersing damage-causing bird species. These devices are sometimes effective but usually only for a short period of time before birds become accustomed and learn to ignore them (Schmidt and Johnson 1984, Bomford 1990, Rossbach 1975, Mott 1985, Shirota and Masake 1983, and Arhart 1972). In Mississippi, cormorants intensely harassed with pyrotechnics at roost sites were greatly reduced in comparison with numbers at roosts that were not harassed or less intensely harassed. Harassment of cormorant roosting sites resulted in a reduction in cormorant predation and less money spent on cormorant control compared with previous years with no roost harassment (Mott et al. 1998). Williams (1983) reported an approximate 50% reduction in blackbirds at two south Texas feedlots as a result of pyrotechnics and propane cannon use. However, they are often not practical in dairy or feedlot situations because of the disturbance to livestock, although livestock can generally be expected to habituate to the noise. Birds, too, quickly learn to ignore scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Visual scaring techniques such as use of Mylar tape (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes give birds a visual cue that a large predator is present), flags, effigies (scarecrows), sometimes are effective in reducing bird damage. Mylar tape has produced mixed results in its effectiveness to frighten birds (Dolbeer et al. 1986, Tobin et al. 1988, Belant and Ickes 1997). Pochop et al (2001) tested a visual barrier made of woven black polypropylene fabric in parallel rows 5 m apart to discourage gull nesting to protect salmon smolt along the Columbia River in Washington State. The zone with fencing had 84% fewer nests than the control zone. Silt fencing showed potential as a non lethal bird management technique. Generally, birds quickly learn to ignore visual and other scaring devices if the birds' fear of the methods is not reinforced with shooting or other tactics.

Lasers are a non-lethal technique recently evaluated by the NWRC (Blackwell et al. 2002, Glahn et al. 2000a). The low-powered laser has proven to be effective in dispersing a variety of bird species in a number of different environments. The low-powered laser is most effective before dawn or after dusk when the red beam of the laser is clearly visible. Bright sunlight will "wash out" the laser light rendering it ineffective. Although researchers are not sure if birds see the same red spot as people, it is clear that certain bird species elicit an avoidance response in reaction to the laser. The birds view the light as a physical object or predator coming toward them and generally fly away to escape. Research, however, has shown that the effectiveness of low-powered lasers varies depending on the bird species and the context of the application.

Low-powered lasers have proven effective against crows, gulls at landfills, and vultures. In Hawaii, they have been tested as a potential means for moving endangered species out of industrial areas and airports where their foraging activities put the birds themselves at risk and pose a safety threat to air traffic.

It has been found that blackbirds, starlings, and pigeons generally don't readily respond to low-powered lasers (Blackwell et al. 2002). The reason for this distinction in response is likely due to the very different eye structure of

bird species active at night or in low-light situations. Because these species are active during the day, traditional means of dispersal are still most effective with these species.

The low-powered lasers that have been developed safely and effectively disperse birds without harming them or people. At higher levels, lasers can burn tissue, causing injury to people and animals. Although low-powered lasers can be effective when used in combination with other non-lethal methods, they should not be considered a cure-all. As with any non-lethal measure, once enforcement stops, problem birds can return to cause conflict again. In certain situations, non-lethal management efforts must be continuous to have the desired impact.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Nest destruction is generally only applied when dealing with a single bird or very few birds. This method is used to discourage birds from constructing nests in areas which may create nuisances for home and business owners. Heusmann and Bellville (1978) reported that nest removal was an effective but time-consuming method because problem bird species are highly mobile and can easily return to damage sites from long distances, or because of high populations. Nest destruction can be very time consuming because most birds will repeatedly rebuild nests. This method poses no imminent danger to pets or to the public.

Egg addling/destruction are a method of suppressing reproduction in local nuisance bird populations by destroying egg embryos prior to hatching. Egg addling is conducted by vigorously shaking an egg numerous times which causes detachment of the embryo from the egg sac. Egg destruction can be accomplished in several different ways, but the most commonly used methods are manually gathering eggs and breaking them, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the egg from obtaining oxygen (see Egg oiling below). Although WS does not commonly use egg addling or destruction, it is a valuable damage management tool and has proven effective in some applications.

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

NON-LETHAL METHODS - CHEMICAL

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

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

Avitrol is acutely toxic to avian and mammalian species, however, blackbirds are more sensitive to the chemical and there is little evidence of chronic toxicity. Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning, and during field use only magpies and crows appear to have been affected (Schafer 1991). However, a laboratory study by Schafer et al. (1974) showed that magpies exposed to two to 3.2 times the published lethal dose (LD_{50}) in contaminated prey for 20 days were not adversely affected and three

American kestrels that were fed contaminated blackbirds for seven to 45 days were not adversely affected. Some hazards may occur to predatory species consuming unabsorbed chemical in the GI tract of affected or dead birds (Holler and Shafer 1982, Schafer 1981). A formal Risk Assessment found no probable risk is expected for pets and the public, based on low concentrations and low hazards quotient value for non-target indicator species tested on this compound (USDA 1997).

Methyl anthranilate (artificial grape flavoring used in foods and soft drinks for human consumption) could be used or recommended by WS as a bird repellent. Methyl anthranilate (MA) (artificial grape flavoring food additive) has been shown to be a promising repellent for many bird species, including gulls and waterfowl (Dolbeer et al. 1993, Belant et al. 1995b). Cummings et al. (1995) found effectiveness of MA declined significantly after 7 days. MA may become available for use as a livestock feed additive (Mason et al. 1984; Mason et al. 1989). It is registered for applications to turf or to surface water areas used by unwanted birds. The material has been shown to be non-toxic to bees (LD_{50} > 25 micrograms/bee[6]), non-toxic to rats in an inhalation study (LC_{50} > 2.8 mg/L[7]), and of relatively low toxicity to fish and other invertebrates. Methyl anthranilate is naturally occurring in concord grapes and in the blossoms of several species of flowers and is used as a food additive and perfume ingredient (Dolbeer et al. 1992). It has been listed as "Generally Recognized as Safe" by the FDA (Dolbeer et al. 1992).

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

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

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

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

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

pathways. The agent is currently approved for use by WS in other states as an Investigative New Animal Drug by the FDA rather than a pesticide, but it is not currently registered for use in the state of Rhode Island.

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

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

Tactile repellents. A number of tactile repellent products are on the market, which reportedly deter birds from roosting on certain structural surfaces by presenting a tacky or sticky surface that the birds avoid. However, experimental data in support of this claim are sparse (Mason and Clark 1992). The repellency of tactile products is generally short-lived because dust and temperature extremes reduce their tackiness. They sometimes cause aesthetic problems and expensive clean-up by running down the sides of buildings in hot weather.

Egg oiling is a method for suppressing reproduction of nuisance birds by spraying a small quantity of food grade vegetable oil or mineral oil on eggs in nests. The oil prevents exchange of gases and causes asphyxiation of developing embryos and has been found to be 96-100% effective in reducing hatchability (Pochop 1998, Pochop et al. 1998). The method has an advantage over nest or egg destruction in that the incubating birds generally continue incubation and do not re-nest. Blackwell et al. (2000) found that gull eggs oiled later (7-15 days before expected hatch date) in the incubation period were less likely to produce chicks (1% hatch versus 20% hatch) than eggs oiled early (21-27 days before EHD) in the incubation period. The EPA has ruled that use of corn oil for this purpose is exempt from registration requirements under FIFRA. To be most effective, the oil should be applied anytime between the fifth day after the laying of the last egg in a nest and at least five days before anticipated hatching. This method is extremely target specific and is less labor intensive than egg addling.

LETHAL METHODS - MECHANICAL

Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large numbers of birds are present. In a comparison between the use of pyrotechnics and shooting as a method to disperse cormorants from their night roosts in Mississippi, shooting was found to be at least equally as effective as pyrotechnics for dispersing cormorants from their night roosts. It was also found to be unlikely to result in a large number of birds being killed (Glahn 2000, Glahn et al. 2000b). Normally shooting is conducted with shotguns, rifles or air rifles. Shooting is a very individual specific method and is normally used to remove a single offending bird. However, at times, a few birds could be shot from a flock to make the remainder of the birds more wary and to help reinforce non-lethal methods. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997). Shooting with shotguns, air rifles, or rim and center fire rifles is sometimes used to manage bird damage problems when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. All firearm safety precautions are followed by WS when conducting GDM activities and all laws and regulations governing the lawful use of firearms are strictly complied with.

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

Live-trap and euthanasia can be used to reduce local populations of birds. Birds captured in live traps are subsequently euthanized by AVMA approved methods of cervical dislocation or CO_2.

Live traps include:

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

Nest traps are used to capture birds attracted to an area where nesting is occurring. Nest traps for gulls are made of a wire mesh box with a funnel opening. The wire mesh box is placed over the nest. When the bird returns and enters the funnel to sit on the nest, it is trapped inside (Weaver and Kadlec 1970). Nest traps as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Mist nets are more commonly used for capturing small-sized birds but can be used to capture larger birds such as ducks and ring-neck pheasants or even smaller nuisance hawks and owls. It was introduced into the United States in the 1950's from Asia and the Mediterranean where it was used to capture birds for the market (Day et al. 1980). The mist net is a fine black silk or nylon net usually 3 to 10 feet wide and 25 to 35 feet long. Net mesh size determines which birds can be caught and overlapping "pockets" in the net cause birds to entangle themselves when they fly into the net.

Cannon nets are normally used for larger birds such as pigeons, feral ducks, and waterfowl and use mortar projectiles to propel a net up and over birds which have been baited to a particular site. This type of net is especially effective for waterfowl that are flightless due to molting and other birds which are typically shy to other types of capture. Gulls can also be baited and captured using cannon nets.

Cervical dislocation is sometimes used to euthanize birds which are captured by hand or in live traps. The bird is stretched and the neck is hyper extended and dorsally twisted to separate the first cervical vertebrae from the skull. The AVMA approves this technique as humane method of euthanasia and states that cervical dislocation when properly executed is a humane technique for euthanasia of poultry and other small birds (Beaver et al. 2001). Cervical dislocation is a technique that may induce rapid unconsciousness, does not chemically contaminate tissue, and is rapidly accomplished (Beaver et al. 2001).

LETHAL METHODS - CHEMICAL

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

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

DRC-1339 is not currently registered for use in Rhode Island but may be considered for use if it becomes registered in the future. For more than 30 years, DRC-1339 has been proven to be an effective method of bird control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies continue to document the effectiveness of DRC-1339 in resolving bird damage problems at feedlots (West and Besser 1976, Glahn 1982, Glahn et al. 1987), and Blanton et al. (1992) reports that DRC-1339 appears to be a very effective, selective, and safe means of urban bird population reduction.

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

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

DRC-1339 has several EPA Registration Labels (56228-10, 56228-17, 56228-28, 56228-29, and 56228-30) depending on the application or species involved in the GDM project should this chemical be registered for future use in Rhode Island.

APPENDIX C

Species that are state listed as threatened, endangered in the State of Rhode Island

Rhode Island Federally Endangered Species

Beetle, Northern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*)
Beetle, American burying (*Nicrophorus americanus*)
Curlew, Eskimo (*Numenius borealis*)
Puma (=cougar), eastern (*Puma (=Felis) concolor couguar*)
Sea turtle, hawksbill (*Eretmochelys imbricata*)
Sea turtle, Kemp's ridley (*Lepidochelys kempii*)
Sea turtle, leatherback (*Dermochelys coriacea*)
Sturgeon, shortnose (*Acipenser brevirostrum*)
Tern, roseate northeast U.S. nesting pop. (*Sterna dougallii dougallii*)
Whale, finback (*Balaenoptera physalus*)
Whale, humpback (*Megaptera novaeangliae*)
Whale, right (*Balaena glacialis (incl. australis)*)
Wolf, gray lower 48 States, except MN and where XN; Mexico (*Canis lupus*)

Rhode Island Federally Threatened Species

Eagle, bald lower 48 States (*Haliaeetus leucocephalus*)
Plover, piping except Great Lakes watershed (*Charadrius melodus*)
Sea turtle, loggerhead (*Caretta caretta*)
Tiger beetle, northeastern beach (*Cicindela dorsalis dorsalis*)

Rhode Island State Endangered Species

Boghaunter, Ringed (*Williamsonia lintneri*)
Spadefoot, Eastern (*Scaphiopus holbrookii*)
Terrapin, Northern Diamondback (*Malaclemys t. terranin*)
Grebe, Pied-billed (*Podilymbus podiceps*)
Bittern, American (*Botaurus lentiginosus*)
Harrier, Northern (*Circus cyaneus*)
Falcon, Peregrine (*Falco peregrinus*)
Sandpiper, Upland (*Bartramia iongicauda*)
Owl, Barn (*Tyto alba*)
Warbler, Cerulean (*Dendroica cerulean*)
Chat, Yellow-breasted (*Icteria virens*)

Rhode Island State Threatened Species

Bobcat (*Lynx rufus*)
Beelte, Pine Barrens Tiger (*Cicindela formosa generosa*)
Beetle, Seabeach Tiger (*Cicindela hirticollis*)
Beetle, Salt Marsh Tiger (*Cicindela marginata*)
Beetle, Dark-bellied Tiger (*Cicindela tranquebarica*)
Elfin, Frosted (*Incisalia iruz*)
Sprite, Southern (*Nehalennia integricollis*)
Snaketail, Brook (*Ophiogomphus asperses*)
Cubtail, Zebra (*stylurus scudderi*)
Whiteface, Crimson-ringed (*Leucorrhinia glacialis*)
Lamprey, American Brook (*Lampetra appendix*)
Bittern, Least (*Ixobrychus exilis*)

Tern, Least (*Sterna antillarum*)
Parula, Northern (*Parula americana*)
Warbler, Black-throated blue (*Dendroica caerulescens*)
Warbler, Blackburnian (*Dendroica fusca*)
Sparrow, Grasshopper (*Ammodramus savannarum*)