ENVIRONMENTAL ASSESSMENT

Bird Damage Management in Washington

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UNITED STATES DEPARTMENT OF AGRICULTURE
Animal and Plant Health Inspection Service
Wildlife Services

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Acronyms Used in the EA

APHIS	Animal and Plant Health Inspection Service
AVMA	American Veterinary Medical Association
BBS	Breeding Bird Survey
BDM	Bird Damage Management
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BNA	Birds of North America
BOR	Bureau of Reclamation
BRN	Bird Research Northwest
CDC	Center for Disease Control
CDFG	California Department of Fish and Game
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FR	Federal Register
FY	Fiscal Year (October 1 through September 30)
IWDM	Integrated Wildlife Damage Management
MBTA	Migratory Bird Treaty Act
MIS	Management Information System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NASS	National Agriculture Statistics Service
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NWRC	National Wildlife Research Center
ODFW	Oregon Department of Fish and Wildlife
OSHA	Occupational Safety and Health Administration
PIT	Passive Integrated Transponder
PUD	Public Utility District
RCW	Revised Code of Washington
RMBO	Rocky Mountain Bird Observatory
SLS	Sodium Lauryl Sulfate
TA	Technical Assistance
T&E	Threatened and Endangered

USACE	United State Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USDI	United Sates Department of Interior
USFS	United State Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USN	United States Navy
WA	Washington
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
WOS	Washington Ornithological Society
WS	Wildlife Services
WSDOT	Washington Department of Transportation

CHAPTER 1 PURPOSE AND NEED FOR ACTION

1.1 Introduction

Across the United States, wildlife habitat changes as human populations expand and land is transformed to meet varying human needs. Human populations and activities often compete with the needs of wildlife and inherently increase the potential for conflicts between wildlife and people. Additionally, some species not only adjust to human presence, but thrive well beyond the carrying capacity of what natural habitat would have offered. These species, in particular, are often implicated in conflicts between humans and wildlife. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services' (WS) Final Environmental Impact Statement (EIS) (USDA 1997[1]) summarizes the range of values toward wildlife and wildlife damage:

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

1.1.1 Wildlife Acceptance Capacity

Wildlife acceptance capacity, also known as the cultural carrying capacity, is the limit of human tolerance for wildlife or the maximum number of a given species that can reasonably coexist with local human populations (Decker and Purdy 1988). Biological carrying capacity is the land or habitat's ability to support healthy populations of wildlife without degradation to the species' health or their environment over an extended period of time (Decker and Purdy 1988). These principles are especially important because they define public sensitivity to a wildlife species. For any given damage situation, there are varying thresholds of tolerance from people affected by wildlife and any associated damage. This damage threshold is a factor in determining the wildlife acceptance capacity. While an area may have a biological carrying capacity that can support larger bird populations, the wildlife acceptance capacity can be substantially lower. Once the wildlife acceptance capacity is met or exceeded, people seek and may begin to implement damage reduction methods to alleviate damage and human health or safety threats. As the federal agency authorized by Congress to respond to wildlife conflicts, WS may, when requested, implement a program to alleviate human/wildlife conflicts. As a standard protocol, WS utilizes an adaptive, Integrated Wildlife Damage Management (IWDM) program.

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[1] USDA (1997) may be obtained by contacting the USDA, APHIS, WS Operational Support Staff at 4700 River Road, Unit 87, Riverdale, MD 20737-1234.

1.1.2 Integrated Wildlife Damage Management (IWDM)

Wildlife damage management is the alleviation of damage or other problems caused by, or related to, the habits of wildlife and recognized as an integral component of wildlife management (The Wildlife Society 1992). IWDM is the application of safe and practical methods for the prevention and reduction of damage caused by wildlife based on a local problem analysis and the informed judgment of trained personnel. IWDM includes localized habitat and behavioral modification and/or removal of the offending animal(s) through lethal methods. WS uses an adaptive, IWDM approach, commonly known as Integrated Pest Management, where a combination of methods may be used or recommended to reduce wildlife damage. Wildlife damage management is not based on punishing offending animals but is a means to reduce future damage. The imminent threat of damage or loss of human or natural resources is often sufficient for individual actions to be initiated and the need for damage management is derived from the specific threats to resources. WS implements IWDM in accordance with the WS Decision Model[2] (Slate et al. 1992) to address site specificity, maximize effectiveness, and select the most appropriate tool or method for the situation (Figure 1.1). As a result of this approach, WS implements the most practical and effective method(s) proven to reduce or alleviate bird damage.

1.1.3 The WS Decision Model

WS' personnel receive requests for assistance that encompass a wide range of damage, problems, species, locations, and resources. Each request is unique and access to a variety of methods allows personnel to formulate a more responsible and successful strategy. Implementation of these methods is coordinated through the use of the Decision Model, illustrated in Figure 1.1, as described in WS' Programmatic EIS (USDA 1997). Once the problem has been identified, methods and tools are identified for consideration for use in each situation. Methods may be eliminated due to legal, administrative, environmental, economic, or sociocultural considerations. Once a strategy is formulated and the resource manager agrees to the plan, methods are employed and results are monitored for effectiveness and impacts. Methods may be re-evaluated and other selections may be made, or new facts may change the initial assessment of the problem. Projects are concluded when WS personnel are no longer directly involved in management activities for a specific problem. Some projects may be

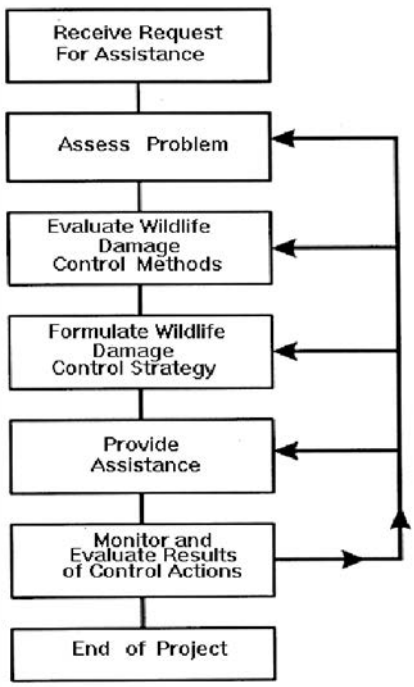

Figure 1.1. WS Decision Model for Developing Strategies to Respond to Wildlife Conflicts.

[2] The WS Decision Model is not a written process but rather a mental problem solving process similar to other professions to determine appropriate management actions to take.

relatively short term, requiring only technical assistance (TA), while others may be ongoing, such as chronic threats from wildlife at airfields.

1.1.4 Cooperators

WS is authorized to enter into cooperative agreements with federal and state agencies, local jurisdictions, individuals, organizations, and institutions to reduce risks from injurious/nuisance animal species and those species that are reservoirs for zoonotic diseases. WS activities and assistance are contingent upon funding from entities cooperating with and/or requesting WS' services and/or upon appropriations or specific authorization from the state or federal government.

Before WS conducts wildlife damage management activities, Agreements for Control, Work Plans, or other comparable documents, must be executed between WS and the requester of services or land owner/administrator/agency representative (WS Directive 2.210[3]). WS works on a cost-share basis with cooperators to protect resources. Cooperators often pay 100% of the costs associated with wildlife damage management.

WS provides assistance to private and public entities which often depend on WS' expertise in reducing losses caused by wildlife. WS also cooperates with other land and wildlife management agencies, when requested and as appropriate, to combine efforts to effectively and efficiently resolve wildlife damage problems in compliance with applicable federal, state, and local laws and Memoranda of Understanding (MOUs) (WS Directive 2.210)

1.2 Bird Damage Management in Washington

Bird damage management (BDM) is the combination of TA and operational damage management to reduce or eliminate bird damage, or the threat of damage, to a particular resource. TA includes recommendations, guidance, and instruction on how to use BDM methods that can be safely and effectively used by cooperators. WS is not responsible for the application of methods by cooperators as a result of TA and has Categorically Excluded TA from the National Environmental Policy Act (NEPA) [7CFR372.5(c)]. Operational damage management is applied by WS personnel for situations where professional expertise is needed (*e.g.*, trapping and lethal management). Resource owners requesting operational damage management assistance are also encouraged to use nonlethal management strategies[4] when and where appropriate to help reduce damage and minimize lethal take whenever possible (WS Directive 2.101).

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[3] The WS Policy Manual provides WS personnel guidance in the form of program directives. Information contained in the WS Policy Manual and its associated directives has been used throughout this EA, but have not been cited in the Literature Cited appendix. WS Directives can be found at: http://www.aphis.usda.gov/wildlife_damage/ws_directives.shtml

[4] The implementation of nonlethal methods may be a prerequisite to obtaining state or federal wildlife permits.

A range of legal operational damage management methods are available for reducing bird damage. These methods fall into two categories: preventive (*e.g.*, habitat modification, deterrents, exclusion) and corrective (*e.g.*, harassment and removal). BDM would be conducted when requested on public and private lands where an *Agreement for Control,* or other appropriate document, is signed. All BDM would comply with applicable federal, state, and local laws, permitting processes and current MOUs, Memorandums of Agreements (MOA), or work plans between WS and the various management agencies (WS Directive 2.210).

1.2.1 Permits

All BDM on protected birds is conducted under the appropriate permits issued by the United States Fish and Wildlife Service (USFWS) and/or the Washington Department of Fish and Wildlife (WDFW). WS receives multiple permits for various aspects of its BDM program, as well as working under permits issued to cooperators. Permits include those issued for the protection of salmon, protection of human health and safety, depredation permits for bird conflicts, scientific permits for disease sampling, and other activities to allow resolution of bird damage or potential damage as identified.

1.3 Purpose of the Environmental Assessment

Washington (WA) WS developed multiple Environmental Assessments (EA) to identify and evaluate any impacts of WS' actions for the protection of human health, safety, and property on public and private lands in WA. These involved predatory birds (August 1997), resident Canada geese (*Branta canadensis*) (November 1999), non-migratory, feral, Federal Depredation Order birds (November 2000), migratory birds (October 2001), and piscivorous birds (June 2003). Each EA was written as the need for assistance with bird damage was requested from private/public individuals/agencies and as the BDM program in WA developed. WS' policy is to review actions relative to each EA on a regular basis to determine if new issues have arisen, actions are consistent with the analyses in the EAs, and to clearly communicate to the public the analysis of cumulative impacts of WS' actions. Rather than continue analyzing WS' actions relative to each independent EA, WA WS believes it can better communicate with the public and more comprehensibly evaluate its impacts, actions, cumulative effects, and whether any new issues have arisen by combining each of the above EAs into a single new and updated EA. This EA, Bird Damage Management in Washington, is that document.

According to APHIS procedures for implementing NEPA, individual BDM actions considered in this analysis may be afforded a Categorical Exclusion (CE) (7 CFR §372.5(c), 60 Federal Register (FR) 6,000, 6,003, 1995). Recommendations for TA are categorically excluded through WS' Programmatic NEPA implementation regulations and guidance. All WS BDM in WA would be undertaken according to relevant laws, regulations, policies, orders and procedures, including the Endangered Species Act (ESA) (WS Directive 2.210). Notice of the availability of this document will be published consistent with the agency's NEPA procedures.

1.4 Proposed Action

WS proposes to continue an adaptive integrated BDM program in WA for the protection of agriculture, property, human health and safety, and natural resources by responding to requests for assistance through the implementation of integrated and adaptive BDM strategies using the WS Decision Model. Under the proposed action, WS would encourage the use of practical, effective, and legal methods, used alone or in combination, to meet the needs of requesters to resolve conflicts. In accordance with WS Directive 2.101, preference is given to practical and effective nonlethal methods[5]. Most wildlife damage situations require professional expertise, an organized damage management effort, and the use of multiple damage management methods to sufficiently resolve them; this will be the task of WS personnel who are trained and equipped to handle most damage situations. WS personnel use the WS Decision Model to evaluate strategies in the context of their availability (legal and administrative) and suitability based on biological and social considerations[6]. Following this evaluation, the method(s) deemed to be practical are implemented into a management strategy for the situation. WS' BDM is coordinated with regulatory and wildlife management agencies and serves to provide effective resolution of bird damage problems. The protected resource, species, location and type of damage, and available biologically sound, efficient, and legal methods will be analyzed in this EA to determine a course of action to alleviate each conflict.

WS may respond to requests for assistance with TA or operational BDM (when funding is provided). When operational BDM is conducted, IWDM would be implemented. WS employees provide TA on a variety of methods that resource owners/managers may use, including localized habitat modification and exclusion[7]. TA can be used to resolve certain problems where resource owners can safely and effectively apply methods or where funding is not available for WS personnel to conduct operational BDM. Nonlethal methods[8] implemented under the Proposed Action could include: harassment, exclusionary devices, auditory and visual deterrents, repellents, recommendations for habitat modification, and live trapping and translocation. Lethal methods implemented under the Proposed Action could include egg addling/oiling/removal, euthanasia following live capture, pesticides, and shooting.

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[5] Immediate threats to human health and safety may take precedence over the implementation of nonlethal methods and the removal of individual birds may occur concurrently with the implementation of nonlethal strategies.

[6] As new information or method(s) become available, they are evaluated and could be integrated into the current program/Proposed Action following NEPA compliance.

[7] BDM methods that are currently implemented and/or recommended by WS are detailed in Appendix B.

[8] In many situations, the implementation of nonlethal methods such as exclusion-type barriers, habitat modification, and repellents would be the responsibility of the requestor to implement.

The primary bird species for which WS received requests for assistance and provided the greatest extent of BDM assistance, from Fiscal Year (FY) 06 through FY10, is listed in Table 1.1. WA WS anticipates continuing to conduct lethal and nonlethal BDM for these species and will analyze take of these species in detail. WS also provided operational BDM assistance on the bird species listed in Appendix A for FY06 through FY10 and anticipates continuing to provide minimal assistance with these species. This list should not be considered exhaustive because human/bird conflicts may occur anywhere in WA and the analysis in this EA anticipates and analyzes for that possibility. However, take of any bird species will comply with annually issued USFWS and/or WDFW permits, federal laws, and applicable state laws and regulations.

Table 1.1. Species for which TA wa provided by WS, FY06-FY10.

Species	Number of TA Requests
pigeons, feral (rock)	683
gulls, glaucous-winged	680
geese, canada	652
starlings, european	650
crows, american	450
crows, northwestern	362
cormorants, double-crested	360
sparrows, house/english	336
herons, great blue	307
gulls, herring	306
gulls, western	305
flickers, northern	51
ducks, mallards	39
birds, unidentifiable	34
geese, snow, greater	31

1.5 Need for Action

WS has the responsibility to respond when assistance is requested (Appendix B: Authorities and Compliance). From FY06 through FY10, WA WS assistance was requested on 1,079 occasions (Management Information Systems (MIS) 2011). These requests covered a variety of resources and species and often included estimates or actual costs of damage. For the analyzed time period, WA WS recorded approximately $14 million in bird-caused damages to resources and property in Washington (MIS 2011). The proposed action is based on the need for a BDM program to facilitate responses to requests for assistance to reduce bird damage or potential damage in WA.

The sections below provide a description of resources damaged by birds in WA. Detailed discussion of damage and environments in WA are provided in Chapter 2: Affected Environment.

1.5.1 Agriculture

Nationwide, WS provides assistance to agricultural producers to protect crops from wildlife damage. WA has approximately 39,400 agricultural production farms and 14,800,000 acres in agriculture production, and the total value of all agriculture in WA is approximately $7.7 billion (National Agriculture Statistics Service (NASS) 2009). Agriculture, as a whole, (including production, processing, marketing, etc.) accounts for approximately 13% of the gross state product (NASS 2010). Field crops, fruit, berry, and nut crops, as well as livestock production are all susceptible to damage from birds. Bird damage reported to WA WS for the FY06 through FY10 period totaled nearly $1.5 million and encompassed several types of damage (MIS 2011). These damages pose a significant economic threat to individual agricultural producers and may affect

individuals' livelihoods. Bird damage may be minimal in some instances, and many producers may ignore those damages, but other producers can have more substantial damage and these producers generally seek assistance from WS and provide damage information.

1.5.2 Human Health and Safety Concerns

1.5.2.1 Human Health Concerns

WA WS commonly receives requests for assistance with bird damage caused by the accumulation of avian feces. Often, requests from cooperators are prompted by warnings from safety officials or agencies for the protection of human health. Birds foul buildings, bridges, and other structures with feces and nesting materials and are host to many naturally occurring zoonotic diseases which are transmissible to humans and pets (Weber 1979). Bird feces contain corrosive acids and are laden with bacteria, either of which may endanger human health (*e.g.*, excessive fecal matter on handrails, stairs and walkways, ventilation intakes, etc.). For FY06 through FY10, WA WS recorded approximately $332,000 in bird damages where feces caused illness or injury, or resulted in an expense for cleanup. Disease transmission may occur when people come in contact with contaminated areas or diseased birds. The people at greatest risk of contracting zoonotic diseases are those who come into direct contact with bird feces or are exposed to feces-contaminated dust in ventilation systems.

1.5.2.2 Human Safety Concerns

WA WS responds to requests for assistance regarding bird hazards at airports. The need to respond to requests for assistance from airports is based on the potential for loss of human life and expensive damage to aircraft. From FY06 through FY010, the Federal Aviation Administration (FAA) and WS recorded $1.8 million in wildlife damage to civil aircraft, the U.S. Air Force (USAF) reported approximately $970,000 in damages for USAF aircraft, and the U.S. Navy (USN) reported approximately $1 million in damages to naval aircraft in WA.

1.5.2.3 Property Damage

Bird damage to property in WA State, as reported to WS, totaled approximately $10.5 million for FY06 through FY10. Physical damages to buildings, structures, and other property are not only expensive, but can lead to health and safety concerns. Bird feces and nesting material can damage vehicles, homes, buildings, aircraft, water craft, equipment, bridges, industrial facilities, and other property. Birds nesting in utility structures may cause power outages by shorting-out transformers and substations (*e.g.*, loss of electricity can threaten human health when medical equipment is affected or people cannot heat their homes or get running water).

1.5.2.4 Protection of Natural Resources

WA WS works with several agencies to protect natural resources and threatened and endangered (T&E) species. Agencies include: the U.S. Army Corps of Engineers

(USACE), USFWS, National Marine Fisheries Service (NMFS), Public Utility Districts (PUD's), WDFW, and others. Migrating T&E salmon and steelhead smolt become more susceptible to predation by birds as they pass through dams on their migration to the ocean. Dams locally concentrate their numbers and the currents at outfalls can cause them to become temporarily disoriented and remain near the surface where they are more vulnerable to predation. Federal agencies, including WS, are required to help protect T&E species, and specific regulations and monitoring are also in place for hydroelectric facilities to help ensure smolt survival. Fish bypasses, "fish friendly" turbines, and many other measures are constructed by hydroelectric facilities to protect and enhance salmon and steelhead survival. Hydroelectric facilities also work to protect migrating smolt from the opportunistic feeding activities of predatory birds. WS assists these facilities and agencies to reduce this predation. Other damages to natural resources caused by birds, especially waterfowl and gulls, can include damage to watersheds and soil from overgrazing, erosion, and the contamination of beaches and waters with fecal material.

WA WS recorded approximately $237,000 in damages to natural resources for the analysis period (MIS 2011), but it is not always possible to assign a value to natural resources. The USACE presented a breakdown of Juvenile Salmon Economic Valuation in USACE (2004) which shows an annual cost of $500 million for salmonid restoration programs, with the value of one adult salmon equaling $300. USACE estimates that it takes 50 juvenile salmon to return one adult, because in part it is estimated that up to 40% of some seaward salmon migrations are consumed by piscivorous birds.

1.6 Decisions to be Made

WS is the lead agency for this EA and therefore responsible for the scope, content, and decisions made. Based on the scope of this EA, the decisions to be made are:

- How can WA WS best respond to the need to reduce bird damage in WA?
- What are the environmental effects from implementing various management strategies?
- Does the proposal have significant enough effects to require an EIS?

1.7 Scope of the EA

1.7.1 Actions Analyzed

This EA evaluates a proposed BDM program to protect agriculture, human health and safety, property, and natural resources in WA.

1.7.2 Period for which this EA is Valid

This EA will remain valid until WS and other appropriate agencies determine that a new need for action is warranted, conditions change, or new alternatives having different environmental effects must be analyzed. At that time, this EA would be reviewed, supplemented or reissued pursuant to NEPA, as appropriate.

1.7.3 Site Specificity

Because the proposed action is to implement an adaptive, integrated BDM program throughout WA, it is conceivable that additional damage management efforts may be requested. This EA analyzes the effects from existing actions while trying to forecast potential needs for assistance, and analyzes the impacts from those potential actions. It emphasizes significant issues as they relate to specific areas whenever possible. If requests for assistance are obtained that incorporate aspects not analyzed in this EA, additional NEPA analysis and compliance would be conducted.

By using the Decision Model (Slate et al. 1992), WS believes it meets the intent of NEPA with regard to site-specific analysis and that this is the only practical way for WS to comply with NEPA and still be able to accomplish its mission. WS determined that a more detailed and more site-specific level of analysis would not substantially improve the public's understanding of the proposal, the analysis, the decision-making process, and pursuing a more site-specific and more detailed analysis might even be considered inconsistent with NEPA's emphasis on reducing unnecessary paperwork (Eccleston 1995). In addition, in terms of considering cumulative impacts, one EA analyzing WS BDM affects in WA will allow better monitoring than multiple EA's covering smaller zones within WA.

1.7.4 Resources Not Currently Protected by WS BDM

The current program operates on a small percentage of the area within WA and provides assistance when requested. This EA analyzes effects at the current program level and attempts to identify increased program levels should individuals or agencies request assistance. Any increase is anticipated to be minimal and within the scope of the EA.

1.7.5 WA Native American Tribes

If Native American Tribes request WS assistance, the methods employed and potential effects would be the same as for any private land upon which WS could provide services. WS would only use methods discussed and analyzed in this EA and would address cultural concerns with tribal representatives at the time an agreement is signed. Therefore, this EA covers such actions as requested and implemented.

Currently, WA WS has no MOUs with Washington Native American Tribes. If WS enters into an agreement with a Native American Tribe for BDM, this EA would be reviewed and, if appropriate, supplemented to ensure compliance with NEPA. MOUs, agreements and NEPA compliance would be conducted, as appropriate, before conducting any BDM on tribal lands.

1.7.6 Public Lands

WS may provide BDM on public lands in WA as requested by the USFWS, U.S. Forest Service (USFS), Bureau of Land Management (BLM), USACE, WDFW, or other public land management agency under the appropriate permits and authorizations. The strategies and methods employed would be the same on these lands as they would be

on other lands upon which WS provides BDM. If WA WS were requested to conduct BDM on public lands for the protection of resources, WS would consult with the land management agency and this EA would cover actions taken.

1.8 Laws and Regulations

The WS program carries out its federal wildlife damage management responsibility to resolve problems that occur when human activity and wildlife are in conflict, while recognizing that wildlife are an important public resource greatly valued by the American people. The authorities imparted to the Secretary of Agriculture by the Act of March 2, 1931, as amended, and the Act of December 22, 1987, have been delegated to APHIS, a USDA agency. Within APHIS, these authorities have been delegated to the WS program. Accordingly, WS' authorities support and authorize its mission of providing federal leadership and expertise to reduce problems caused by injurious and/or nuisance wildlife to human health and safety[9], to agricultural and other natural resources, including other wildlife and T&E wildlife; and minimizing potential wildlife harm or threats. WS' Policy Manual reflects this mission and provides guidance for conducting wildlife damage management.

The current WS program is subject to legal/administrative authorities (*e.g.,* Act of March 2, 1931, as amended), other federal laws, and applicable state laws and statutes, and takes into account the biological, physical, and socio-cultural environment when evaluating BDM actions and methods to resolve conflicts. Other federal and state agencies are tasked with various aspects in managing public resources, and are integral to the application of IWDM. For a more detailed discussion of agencies, laws, and regulations, see Appendix B. Below is a brief discussion of agencies and regulations that apply to the analysis.

Agency Participation in Preparation:

WS consults and cooperates with other federal and state agencies, as appropriate, to ensure that all WS activities are carried out in compliance with all applicable federal and state laws.

U.S. Army Corps of Engineers. USACE operates select dams along the Columbia and Snake Rivers.

Bureau of Reclamation (BOR). Founded by the Reclamation Act of 1902, the BOR oversees water resource management, including several hydroelectric facilities along the Columbia and Snake Rivers in WA.

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[9] See www.aphis.usda.gov/ws/mission.html. Examples of APHIS-WS activities include: training of wildlife damage management professionals; development and improvement of strategies to reduce losses and threats to humans from wildlife; collection, evaluation, and dissemination of management information; 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.

United States Fish and Wildlife Service. The USFWS is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife resources and their habitats.

Federal Aviation Administration. The FAA's authority for managing wildlife hazards at airports is based on 14 CFR, Part 139.337. The FAA is the federal agency responsible for developing and enforcing air transportation safety regulations and is authorized to reduce wildlife hazards at commercial and non-commercial airports. A MOU was developed in 1998 between the FAA and WS, establishing a cooperative relationship between the two agencies to resolve wildlife hazards to aviation.

National Marine Fisheries Service. NMFS is responsible for ensuring that hydroelectric facilities do not compromise the survival of migrating salmon and steelhead under the ESA and the Magnuson-Stevens Fishery Conservation and Management Act.

Oregon Department of Fish and Wildlife (ODFW). ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations.

Washington Department of Fish and Wildlife. WDFW has the commission to "preserve, protect, perpetuate, and manage wildlife…" in the state under the Revised Code of WA (RCW) 77.04.012.

Washington Department of Transportation (WSDOT). WSDOT's authority for managing transportation in the State is derived from RCW 47.01.011.

Compliance with Federal Laws, Executive Orders and Regulations

National Environmental Policy Act: All federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS follows the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and WS follows the APHIS Implementing Guidelines (7 CFR 372) as a part of the decision-making process.

Endangered Species Act: Under the ESA, all federal agencies are charged with a responsibility to conserve T&E species and to utilize their authorities in furtherance of the purposes of the ESA (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to utilize 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* . . ." (Sec.7 (a) (2)). WS conducts formal Section 7 Consultations with the USFWS at the national level (USDI 1992) and consultations with the USFWS at the local level, as appropriate.

Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as amended: The MBTA provides the USFWS regulatory authority to protect species of birds that migrate outside the U.S. The law prohibits any "take" of these species by private entities, except as permitted by the USFWS; therefore the USFWS issues permits to reduce bird damage (50 CFR 21.41). European starlings (*Sturnus vulgaris*), feral pigeons (*Columba livia*), house sparrows (*Passer domesticus*) and domestic/feral birds are not classified as

protected migratory birds and therefore have no protection under the MBTA. USFWS Depredation Permits are also not required for yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), red-winged blackbirds (*Agelaius phoeniceus*), Brewer's blackbirds (*Euphagus cyanocephalus*), American, crow (*Corvus brachyrhynchos*), northwestern crow (*C. caurinus*), fish crows (*C. ossifragus*), cowbirds (*Molothrus* spp.), grackles (*Quiscalus* spp.), and magpies (*Pica* spp.) "found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance" (50 CFR 21.43). One additional exemption to USFWS Depredation Permits is found in 50 CFR 21.46: "Landowners, sharecroppers, tenants, or their employees or agents actually engaged in the production of nut crops in Washington and Oregon may, without a permit, take scrub jays (*Aphelocoma coerulescens*) and Steller's jays (*Cyamo cittastelleri*) when found committing or about to commit serious depredations to nut crops on the premises owned or occupied by such persons…" This exemption applies only to the Washington counties of Clark, Cowlitz and Lewis, and only between August 1 and December 1 of any year. In other locations in Washington, for other reasons, or at other times of the year, control of these species would be subject to MBTA permitting requirements.

Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. §§ 668-668d, June 8, 1940, as amended 1959, 1962, 1972, and 1978): The BGEPA prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Transport includes convey or carry by any means; also deliver or receive for conveyance.

National Historical Preservation Act (NHPA) of 1966, as amended: The NHPA and its implementing regulations (CFR 36, 800) require federal agencies to initiate the section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under section 106.

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

Occupational Safety and Health Act of 1970: The Occupational Safety and Health Act of 1970 (OSHA) and its supplementing 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.

Environmental Justice and Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations: Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. The nature of WS' BDM activities is such that they do not have much, if any, potential to result in disproportionate environmental effects on minority or low-income populations. Therefore, no such adverse or disproportionate environmental impacts to such persons or populations are expected.

Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks: Children may suffer disproportionately from environmental health and safety risks, including their developmental physical and mental status, for many reasons. Based on the Risk Assessment (USDA 1997, Appendix P), WS concluded that when program chemicals and non-chemical methods are used following label directions, normally accepted safety practices, and WS standard operating procedures, such use has negligible impacts on the environment or on human health and safety, which includes the health and safety of children.

Executive Order 13112 - Invasive Species: Authorized by former President Clinton, EO 13112 establishes guidance to federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The EO, in part, states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species.

Executive Order 13186 and MOU between USFWS and WS: EO 13186 directs federal agencies to protect migratory birds and strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and minimize the take of migratory birds through enhanced collaboration between WS and the USFWS, in coordination with state, tribal, and local governments. A national-level MOU between the USFWS and WS has been drafted to facilitate the implementation of EO 13186.

1.9 Related Environmental Documents

1.9.1 WS Programmatic Environmental Impact Statement (EIS)

WS issued a final EIS (USDA 1997) and Record of Decision on the USDA APHIS WS nationwide program. The final EIS (USDA 1997) discussed BDM at the nationwide level and concluded that nationwide the WS program did not impact bird populations. Pertinent portions of the EIS are incorporated by reference in this EA.

1.9.2 Resident Canada Goose EIS

On August 10, 2006, WS issued a Record of Decision on the Resident Canada Goose Management EIS, prepared in cooperation with USFWS. WS will take action under the rules, depredation orders, and permits, in coordination with USFWS and WDFW to reduce resident Canada goose damage in Washington.

1.9.3 EAs Being Superseded by this Document

The following EAs will be superseded by this document:

1) Bird Damage Management [as associated with "depredating" nonnative (invasive) birds, feral domestic waterfowl, nonmigratory birds, and those migratory birds as provided for in 50 Code of Federal Regulations (CFR) in the State of Washington]. (November 2000),

2) Alternative Strategies for the Management of Damage Caused by Migratory Birds in the State of Washington EA. (October 2001), and

3) Piscivorous Bird Damage Management for the Protection of Juvenile Salmonids on the Mid-Columbia River EA. (June 2003).

The management of predatory birds under the Predator Damage Management in Washington EA (May 2010) will be analyzed under this document.

Chapter 2 AFFECTED ENVIRONMENT

The affected environment is within the geographic boundaries of WA State and the Columbia River, including those areas of Oregon shoreline proximate to USACE dams. WA State contains 66,582 square miles of land and 4,721 square miles of water. Under the current program, WS provides assistance on 1,638 square miles, however projects may occur anywhere in the designated area, where requested (See Section 1.1.4).

2.1 Resources Protected

2.1.1 Agriculture

Nationally, more than half of all farmers and ranchers experience damage from wildlife each year. Wildlife damage to apples, blueberries, and grapes has been estimated at $40 million annually (APHIS 2004). WA is a major producer of several crops, including more than half of the nation's apple crop (NASS 2010) as well as other soft fruits (*e.g.*, berries, cherries, peaches, grapes). WA's top agricultural products include field crops, fruits and nuts, and livestock and their products (NASS 2009).

Producers in WA face several kinds of bird-caused damages; those most commonly encountered by WA WS are consumption and contamination of crops. European starlings, house finches (*Carpodacus mexicanus*), English sparrows, American robins (*Turdus migratorius*), and brown-headed cowbirds (*Molothrus ater*) are often responsible for damages to fruit crops, such as apples, cherries, grapes, and blueberries. Waterfowl, turkeys (*Meleagris spp.*), and other game birds are often responsible for pulling seedling crops. From FY06 throughFY10, starling damages to cherries totaled

more than $262,000 (MIS 2011). Passerine species such as cedar waxwings (*Bombycilla cedrorum*) and American robins have been responsible for damages to blueberries and cherries. Grain crops are especially vulnerable to damage from birds because the grains are exposed through the entire growing season (USDA 2003a). Canada geese, starlings, cowbirds, English sparrows, and feral pigeons caused more than $300,000 in damages to grains and pasture crops in WA from FY06 through FY10 (MIS 2011).

In 2008, livestock production was the third largest agricultural commodity in WA. Many bird species find livestock production facilities attractive food sources because of the protein additives in the feed (Gorenzel et al. 1994). Blackbirds, starlings, English sparrows, feral pigeons, and crows often consume or contaminate feed at cattle feeding facilities and dairies. Flocks of up to 250,000 and more starlings have been reported at feedlots in WA (MIS 2011). Large flocks of birds also carry species of mites that may be introduced into poultry houses (Kern 1997). Black-billed magpies (*Pica hudsonia*) and common ravens (*Corvus corax*) have also been known to destroy eggs, peck out the eyes of lambs, and are responsible for newborn livestock mortality (Hygnstrom et al. 1994, Larson and Dietrich 1970). Ravens have been reported damaging silage bags, resulting in the spoilage of feed.

WA's aquaculture industry produces a large array of products including shellfish, trout, salmon, and aquatic plants, such as seaweed. In 2007, WA aquaculture producers reported $163 million in sales across 355 farms in the state. Piscivorous birds consume, injure, and stress aquaculture crops by feeding and loafing at the facilities. Industry wide, costs associated with bird damage and bird damage prevention exceed $17 million annually (USDA 2003a)

Birds are also vectors for diseases and parasites that negatively impact fish, shellfish, and aquatic plants (Gorenzel et al. 1994). Merganser (*Mergus* spp.) and cormorant (*Phalacrocorax* spp.) damage to salmonids produced for aquaculture purposes (not T&E population enhancement) for FY06 through FY10 totaled more than $469,000 and damages by other species to other aquaculture resources totaled about $100,000. Canada geese have been reported damaging oyster beds through feces contamination. Great blue herons (*Ardea herodias*) and certain species of waterfowl are common predators at trout hatcheries, and injure and stress trout.

These examples are not inclusive of all type of damages that occur to agriculture in WA, just those reported to WS. Damages are only reported to WS when the producers contact WS for assistance, therefore WS is not able to document the majority of losses. Table 2.1 highlights a list of species and damage amounts reported to WS.

2.1.2 Human Health and Safety

2.1.2.1 Human Safety/Aviation

WS provided assistance to 39 airports in WA and continues to conduct BDM at several of these airports. According to the FAA, 92% of birdstrikes occur at or below 3,000 feet above ground level (AGL) and 72% occur at or below 500 feet AGL, making airports and the immediate vicinity the primary areas for BDM in order to reduce wildlife attractants and hazards. Airports encompass large areas of land and are often in close proximity to landfills, wetlands, and other habitats that attract a variety of bird species. Many of these species feed, loaf, or roost near airport runways, and pose a threat to air travelers, pilots, crews, and people on the ground. WA WS actively promotes responsible management of airfields and surrounding areas in an effort to prevent conflicts between birds and aviation.

Table 2.1. Bird damage to agriculture, recorded by WS, FY06-FY10.

Species	Value
starlings, european	$387,628
cormorants, double-crested	$240,002
ducks, merganser common	$200,000
geese, snow, greater	$185,000
geese, canada	$142,675
finches, house	$90,813
gulls, glaucous-winged	$42,125
cranes, sandhill	$27,000
cowbirds, brown-headed	$26,500
robins, american	$24,000
pigeons, feral (rock)	$21,320
crows, american	$12,920
sparrows, house/english	$11,620
blackbirds, red-winged	$10,000
ducks, wigeon, american	$10,000
geese, snow, lesser	$10,000
herons, great blue	$5,006
ducks, bufflehead	$5,000
ducks, merganser, hooded	$5,000

Many bird species enter airport operation areas, and due to their body-size and/or tendency to flock, may cause substantial damage or loss of human life when colliding with aircraft. Birds commonly encountered in airport environments in WA include: waterfowl (Family *Anatidae*), gulls (Family *Laridae*), corvids (Family *Corvidae*), raptors (Family *Accipitridae*), shorebirds (Families *Charadriidae* and *Scolopacidae*)[10], European starlings, and feral pigeons. A steady growth in the populations of some large flocking birds, their successful adaptation to urban landscapes, and increased aircraft operations have contributed to a significant increase in birdstrikes (Dolbeer and Seubert 2006).

Globally, wildlife strikes have killed at least 276 people and destroyed more than 210 aircraft since 1988 (Richardson and West 2000, Thorpe 2010, Dolbeer, unpublished data). Since 1990, there were 167 strikes reported involving U.S. civil and commercial aircraft that resulted in 209 human injuries. Waterfowl, vultures (*Coragyps atratus, Cathartes aura*) and deer (*Odocoileus* spp.) caused 82 of these

[10] The collision of an aircraft with birds is a serious concern at airports throughout WA and may involve many species, including some that may not be analyzed in this EA. Take for species that cause a risk to human health is authorized under USFWS Depredation Permit.

strikes (Dolbeer et al. 2009). In 1995, a military jet taking off at Elmendorf Air Force Base in AK crashed on departure after striking a flock of Canada geese on the runway. All 24 crew members were killed and the $180 million aircraft was destroyed. The "forced landing" of US Airways Flight 1549 in the Hudson River in early 2009, after the ingestion of Canada geese into both engines, endangered the lives of the passengers and crew and destroyed the aircraft.

Nationally, birdstrikes cause an estimated $650 million damage to aviation annually (Begier, unpublished data). According to FAA records, 603 wildlife strikes to civil aircraft were reported in WA from FY06 through FY09, resulting in $1.5 million in damage and lost revenue (FAA 2010). However, it is estimated that only 25 to 39% of all birdstrikes are reported (Dolbeer et al. 1995, Linnell et al. 1996, Linnell et al. 1999, Dolbeer 2009). Consequently, the number of birdstrikes in WA is most likely much higher than records indicate.

2.1.2.2 Human Health[11]

Protection of human health is an important aspect of BDM in WA. The primary risks to human health posed by birds are zoonotic diseases. Zoonotic diseases are infectious animal diseases that are transmissible to humans. Examples of pathogens that cause these diseases are bacteria, fungi, and viruses.

Many zoonotic diseases or their pathogens have been identified in feral pigeons, European starlings, house sparrows, and various waterfowl species, as well as in and other migratory bird species (Weber 1979). The primary zoonotic diseases of birds in WA include salmonellosis, chlamydiosis, histoplasmosis, Newcastle disease, West Nile virus, and avian influenza. Salmonellosis, chlamydiosis, West Nile virus, and highly pathogenic avian influenza are reportable diseases.

Accumulations of bird feces and direct contact are the two most likely ways that wild birds can contribute to the risk of human exposure to salmonellosis, chlamydiosis, histoplasmosis, Newcastle disease, and avian influenza. The role of wild birds in the transmission of the West Nile virus pathogen is different, with birds acting as a reservoir host for the virus that is transmitted by mosquito vector from bird to human. While wild birds can play a role in the transmission of zoonotic pathogens, the ability of the pathogen to actually cause illness in a human varies with the virulence of the pathogen, the amount of exposure an individual experiences, and the route of infection.

The Centers for Disease Control (CDC) (www.cdc.gov/ncezid) and the United States Geological Survey (USGS) National Wildlife Health Center (www.nwhc.usgs.gov)

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[11] OSHA regulates sanitation standards in the workplace through 29 CFR 1910.141(a) (5). Fines may be relatively high for failures to abate hazards associated with bird droppings. For example, OSHA fined a Hoboken, NJ manufacturing company $673,400 for failing to abate hazards associated with "severe accumulations of pigeon droppings" (Mansdorf 1999). Clean up and removal of large amounts feces can be a precarious task that must be conducted correctly to prevent making infectious particles airborne.

provide additional specific information about bird-related zoonotic diseases and their potential risks.

2.1.3 Damage to Property

Increased urbanization has changed and, in most cases, lead to a reduction in native wildlife habitat. As wildlife populations continue to expand, conflicts between humans and wildlife will continue to increase (USDA 2004). Nationally, birds cause millions of dollars in damage each year to homes, boats and marinas, aircraft, parks, equipment, machinery, industrial facilities, roads and bridges, parks, and other resources. Table 2.2 highlights damages by species as reported to and/or verified by WS in WA. Corrosion damage to metal structures and painted finishes (*e.g.*, bridges) can occur because of uric acid from bird droppings. Utility companies frequently have problems with birds and other animals causing power outages by shorting out transformers and substations and disrupting communications. The removal of bird feces and nest material, in conjunction with the reduction in paint life caused by uric acid, increases maintenance costs.

Table 2.2 Bird damage to property, recorded by WS., FY06-FY10.

Species	Value
gulls, glaucous-winged	$3,828,190
terns, caspian	$1,743,100
starlings, european	$1,727,825
pigeons, feral (rock)	$1,365,239
cormorants, double-crested	$628,900
geese, canada	$176,150
cormorants, pelagic	$140,600
crows, american	$123,166
gulls, california	$112,960
flickers, northern	$104,050
gulls, ring-billed	$103,750
gulls, western	$76,400
sparrows, house/english	$65,459
gulls, herring	$49,850
ducks, wigeon, american	$46,900
gulls, mew	$25,300
parakeets, monk	$24,300
blackbirds, brewer`s	$24,200
crows, northwestern	$22,500
birds, unidentifiable	$17,000
ducks, mallards	$14,205
ducks, teal, green-winged	$12,400
ducks, ring-necked	$11,900
hawks, red-tailed	$11,900
blackbirds, red-winged	$10,400
cowbirds, brown-headed	$7,300
gulls, glaucous	$7,200
ravens, common	$6,700

Vermeer et al. (1988) noted that a $350,000 roof was estimated to last only half as long as originally credited because of chemical erosion caused by defecation and water damage resulting from the blockage of drainage pipes by feathers and nest material of gulls. From FY06 through FY10, WA WS recorded approximately $7.7 million in bird feces damage and prevention costs.

2.1.3.1 Spread of Landfill Refuse

Landfills can be an unintended source of food for gulls, corvids, starlings, and other scavenging birds. Birds often transport trash from landfills to surrounding areas, spreading refuse and disease (Butterfield et al. 1983). Birds at landfills and associated urban nesting have led to an increase in conflicts with humans (Verbeek 1977, Bradley 1980, Burger 1981, Patton 1988, Belant and Dolbeer 1993). In 2000, a landfill in King County, Washington settled a $16.5 million lawsuit with neighbors over odor, noise, vibration, and bird problems (Seattle Post-Intelligencer 2000). Birds at landfills also defecate on buildings and equipment, risking the health of landfill employees through contact with fecal matter and contaminants from the landfill carried by the birds. Landfills and transfer stations in WA are required to conduct activities to reduce the potential for bird damage (Washington

Administrative Code [WAC] 173-351-200). In some cases these facilities request assistance from WS.

WS currently assists landfills in WA to prevent the spread of refuse and disease by birds, and also with birdstrike hazards association with airports from the same birds. Landfills and transfer stations are often positioned in close proximity to airfields, and the movement of birds to and from these facilities is often hazardous to aviation. Species most commonly observed at landfills include gulls, starlings, crows, blackbirds, and ravens (MIS 2010). WS assists transfer stations with facility design to minimize bird access to refuse, and may further assist with operational BDM should facility design not be adequate to mitigate risks to human health.

2.1.4 Protection of Natural Resources

WA WS cooperates with public, regulatory, and land management agencies for the protection of natural resources. Non-native and native birds may compete with sensitive or less prolific wildlife species and may compete with native species for nesting and foraging resources. The primary example of natural resource conflicts in WA is piscivorous birds depredating on federal and state listed salmonids.

2.1.4.1 Avian Predation on Juvenile Salmonids at Hydroelectric Dams

WS currently protects juvenile T&E salmonids from avian predators, primarily gulls and terns at Columbia and Snake River dams, where they are artificially susceptible to predation by avian predators. Federal regulatory agencies set levels of juvenile salmonid passage standards that dams must achieve. WS works cooperatively with state and federal resource management agencies, including WDFW, ODFW, USFWS, NMFS, USACE, and PUDs to develop and implement an adaptive and integrated program to reduce avian predation at hydroelectric facilities. Hydroelectric development changed the Columbia River basin beginning in 1933 from mostly free-flowing rivers to a series of dams and impoundments by 1975 (Gray and Rondorf 1986, Raymond 1988).

Reservoirs that formed behind dams and dredge spoil deposition created islands that are conducive to piscivorous bird colonization (NMFS 2000). Under the ESA, hydroelectric developments on the Columbia and Snake Rivers must be managed to ensure the continued existence of ESA-listed species. Juvenile salmonids commonly experience a number of stressful events or conditions during their seaward migration. Most of these events occur serially and can have cumulative effects, such when juvenile salmon pass through dams and enter predator-inhabited tailrace areas (USACE 2004). Because dam passage is a stressful event, there is concern that juvenile salmon passing through dams would not be able to cope with subsequent stressors, such as predators (Mesa 1994).

The major causes of mortality of migrating juvenile salmonids in the Columbia River basin were identified as passage through the turbines, total dissolved gas supersaturated water due to spill, migration delays, fish disease, and predation by birds and fishes in the reservoir, forebay, and tailrace (*as cited in* USDA 2003b).

Piscivorous birds often feed in areas of high fish density (Eriksson 1985, Safina and Burger 1985; Kennedy and Greer 1998; Blackwell et al. 1997; Derby and Lovvorn 1997) and attract other birds to feeding areas. Hydroelectric dams act as bottlenecks for juvenile salmonid migration and can injure and disorient smolt, increasing their vulnerability to avian predators (ODFW 1998). Piscivorous birds aggregate below hydroelectric dams in spring and summer and feed on emigrating juvenile salmonids. Between 1998 and 2008, avian predators consumed between 4% and 21% of the juvenile salmonids migrating downriver annually (Muir et al. 2009).

WS' assistance is often requested to augment other T&E protection measures. PUD's that own and manage hydroelectric facilities, along with the USACE, use many tools to ensure fish passage through the dam meets requirements established by NMFS. Hundreds of millions of dollars have been spent to increase salmon survival through the 13 hydroelectric facilities along the Columbia and Snake Rivers in Washington (*e.g.*, approximately ⅓ of the Grant County PUD's entire annual budget goes to fisheries improvements). These expenditures include the installation new fish-friendly turbines in two dams, research for the design and the installation of fish bypass structures, the installation of wire grid exclusion devices, and assistance from WS to deter avian predators. A wide variety of tools are implemented to exclude or otherwise nonlethally harass avian predators prior to taking lethal action. Fish friendly turbines cost approximately $10M each, while the study to design a fish bypass structures is estimated to cost $5-7M. Chelan County PUD has implemented a fish bypass structure, turbine modification, wire grids, perch deterrents, and auditory harassment, as well as lethal management to reinforce nonlethal methods. The Public Power Council (online) reports that more than $5 million was spent on research and management programs to reduce avian predation at USACE dams in 2009.

In addition to the research and installation of fish passage devices, hydroelectric facilities fund WS to reduce avian predation of juvenile salmonids. WS conducts operational BDM at hydroelectric facilities to alleviate the predation of salmonid smolt by avian predators. WS operational activities at dams include the installation of nonlethal wire arrays to deter birds from foraging in the tailrace, the harassment of birds that feed on smolt in the tailraces, and shooting to reinforce nonlethal methods. Wire arrays are constructed over the tailrace and restrict avian predators from accessing the water and salmonids (Figure 2.1). The application of wire arrays and designs at dams are continually adapted and updated to meet changing needs based on dam structure, spill patterns, bird foraging activity, etc. Harassment of avian predators is accomplished by pyrotechnics launched from the shoreline, dam structures, and boats to provide thorough coverage of the tailrace. If harassment is not effective in preventing predation, shooting is used to reinforce nonlethal methods; shooting is not used to manage or reduce populations. Nonlethal harassment comprised more than 98% of WS BDM activities at dams. BDM programs only occur during seasonal smolt passage specific to each facility and

generally within 1,000 feet downstream from the dam and 500 feet upstream from the dam, as defined by USFWS permits.

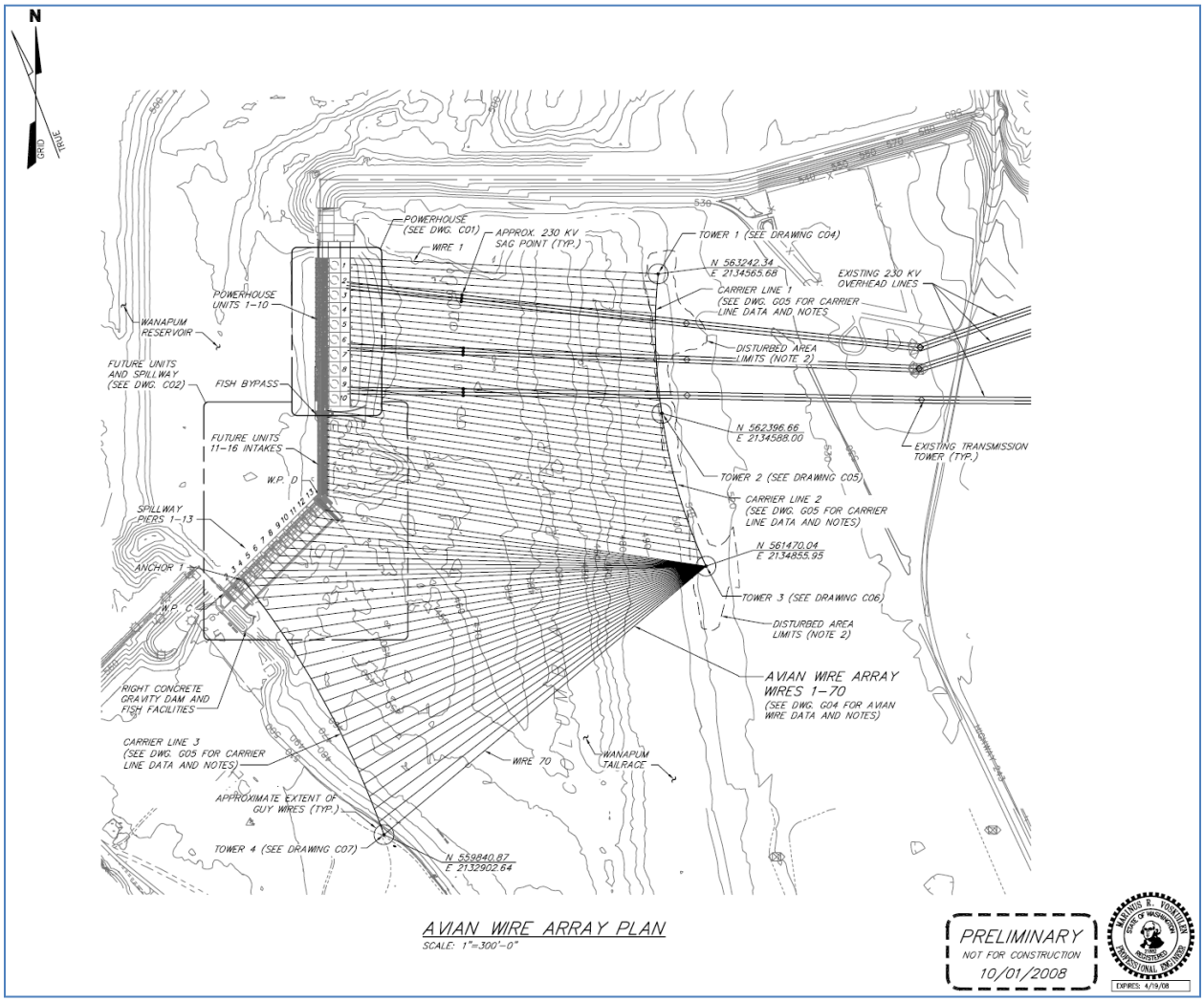

Figure 2.1. Illustration of Wire Array at Wanapum Dam for the protection of Salmonid Smolt.

2.1.4.2 Hatcheries and Juvenile Salmonid Protection

In 1938, Congress passed the Mitchell Act to provide for the conservation of anadromous fishery resources (salmon and steelhead). The Mitchell Act Program is managed under the ESA and is undergoing changes to preserve genetic resources. WDFW operates 91 hatchery facilities, of which 69 produce salmon and/or steelhead while the other 22 raise trout and other game fish. Thirty-five tribal hatcheries and 12 federal hatcheries also contribute to the statewide salmon harvest, which contributed more than $1 billion to Washington's economy in 2000. These hatcheries are an essential tool in the conservation of native, listed salmonids.

Hatchery-raised juvenile smolt are used to strengthen ESA-listed species recovery efforts and supplement tribal, recreational, and commercial harvest (NMFS et al. 1998, Waples 1999). The open-water areas and large concentrations of fish at

hatcheries are natural attractants to many piscivorous birds (Gorenzel et al. 1994). Birds that normally migrate have been observed to remain at aquaculture facilities year round. Proximity to roosting areas often makes aquaculture facilities more attractive to piscivorous birds. Price and Nickum (1995) outlined four categories of bird problems that may occur at hatcheries:

1. Direct predation – smolt are eaten or die as a result of wounds from attempted predation.

2. Interference with artificial feeding - the smolt are stressed by the presence of avian predators and go off their feed, or the birds compete directly with smolt for their food.

3. Spread of disease/continuation of disease outbreaks - pond to pond transmission of disease and parasites where smolt may also be stressed are more susceptible to disease.

4. Disturbance during winter in areas where ponds do not freeze-over leading to stress and competition.

Application of grid-wire systems and harassment may be recommended or implemented by WS in these situations. Lethal reinforcement may be necessary to maintain efficacy of nonlethal methods, and is not a primary management measure.

2.1.4.3 Economic Value of ESA Listed Salmonids and their Protection

The value of ESA-listed juvenile salmonids lost specifically to predation is not presented in this EA because juvenile salmonid values[12] and total avian predation on smolt are not well established. Engeman et al. (2002) reviewed various methods for applying monetary valuations for ESA-listed species, but did not apply these to salmonids. The economic damage resulting from the predation of juvenile salmonids could be represented by the costs associated with the implementation of mitigation measures and the cost of each juvenile lost to avian predation. The

Table 2.3. Juvenile Salmonid Economic Valuation

Description	Estimated Data
Average cost per year for salmonid restoration program	$500 million
Anadromous adults recorded at Bonneville in 2001	4.4 million
Cost of Restoration efforts per adult	$114
Local economic value of one adult (in 1998 dollars)	$186
Total value of one adult	$300
Number of Bonneville smolt required to produce one adult salmonid (average 2% smolt to adult return rate)	50
Average value of a juvenile salmonid individual	$6

[12] In the case of T&E species, their value has been judged "incalculable" (Tennessee Valley Authority vs Hill, US Supreme Court 1978), making it more difficult to specifically quantify the cost and cost effectiveness of efforts to restore or protect these species.

USACE (2004) provided one of the only estimates of expenses associated with salmonid valuations (Table 2.3); however, these are not applicable to all hydroelectric facilities and salmon species.

The price of raising a smolt at a hatchery does not take into account the full value of juvenile salmonids, particularly those species listed under the ESA. Many of the hatchery smolt are produced specifically to supplement natural production, uphold Tribal Treaty obligations, and directly assist in the recovery of ESA-listed species (WDFW 2002, letter to WS). The application of monetary valuations to ESA-listed species is neither straight-forward nor precise (Engeman et al. 2002).

2.2 Bird Species in Washington

According to the Washington Ornithological Society (WOS), there are 493 bird species in Washington (WOS 2008). Four of these species are listed as federally threatened or endangered; the marbled murrelet (*Brachyramphus marmoratus*), spotted owl (*Strix occidentalis*), western snowy plover (*Charadrius nivosus*), and short-tailed albatross (*Phoebastria albatrus*). WA WS has reviewed those listings and determined that the Proposed Action will have "no effect" on those species, based on the geographical separation of their habitat from WS activities. For the purposes of the EA, WS has divided the species presented into functional groups to help summarize significant biological factors for the analysis.

2.2.1 Depredation Order Species

CFR 50 subpart D allows the take of depredating or otherwise injurious birds under specific guidance within each Depredation Order. 50 CFR 21.43 allows the control of yellow-headed, red-winged, and Brewer's blackbirds, American, northwestern, and fish crows, cowbirds, grackles, and magpies without federal permit when they are "found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance". WS may conduct BDM under depredation orders and will responsibly apply BDM methods, as described in this document, to alleviate damage situations or situations where there is a threat of damage. Depredation Order species encountered in damage situations in WA include Brewer's, red-winged, and yellow-headed blackbirds, brown-headed cowbirds, American and northwestern crows, Steller's jays, scrub jays, and black-billed magpies.

2.2.2 Waterfowl

Waterfowl (i.e., ducks, geese, and swans) are monitored and managed by WDFW and USFWS. While conflicts with waterfowl are often addressed through hunting opportunities, urban conflict generally requires alternative approaches. Waterfowl are involved in damage situations in all of the resource categories analyzed in this document. Waterfowl are most commonly implicated in damage situations at airports where they present a significant threat to aviation due to their size and flocking tendencies. Additional types of damage that waterfowl cause include consumption and

contamination of crops, fecal contamination in urban environments, transmission of diseases, and damage to turf and flowers.

2.2.3 Gulls

Gulls commonly nest and loaf on rooftops, equipment, piers, islands, and rocky outcroppings (Butterfield et al. 1983, Monaghan and Coulson 1977, Conover 1983; Winkler 1996, Pierotti and Good 1994, Ryder 1993). When found in urban environments, nesting groups and colonies negatively impact commercial and private structures and human health and safety. OSHA considers bird droppings in the work place hazardous [29CFR 1910.141 (a)(5)] and County Health Departments regularly monitor landfills, transfer stations, and other facilities to ensure they are not allowing gulls or other hazardous wildlife to congregate in a manner that could lead to health risks for employees and the public. Landfills have even been suggested as contributing to increases in gull populations (Verbeek 1977, Patton 1988, Belant and Dolbeer 1993). Regulations mandate that landfills prevent or control potential vectors, such as gulls (40 CFR 258.22, WAC 173-351-200). In addition to health risks from groups and colonies of nesting gulls; nests, feces, and material brought to feed nestlings (*e.g.*, fish, chicken bones, garbage, etc.) cause damage to the structural integrity of rooftops, bridges, and buildings. Structures and property at marinas, docks, shipyards, and utilities are damaged through these activities which can also be aesthetically displeasing.

Gulls can also negatively impact natural resources through habitat degradation, competition with other wildlife, and through direct depredation on natural resources. Habitat degradation occurs when large concentrations of gulls in a localized area negatively impact characteristics of the surrounding habitat that can adversely affect other wildlife species. Competition can occur when two species compete (usually to the detriment of one species) for available resources, such as food or nesting sites. Direct depredation occurs when predatory gull species feed on other wildlife species which can negatively influence those species' populations, especially when depredation occurs on T&E species. Locations with naturally occurring fish populations often attract gulls, and fish hatcheries are frequently constructed near naturally occurring concentrations of fish (Schaeffer 1992). Gulls cause damage at hatcheries and aquaculture facilities by feeding on and stressing broodstock and juvenile fish. Dams act as bottlenecks for juvenile salmonid migration and create currents, backflows, and upwellings where gulls may depredate vulnerable T&E salmonid smolt. Section 4.4.1.2.2 provides a detailed discussion of gull damages to T&E salmonids at dams in WA.

Gulls also often feed and loaf in airport environments where they present a significant birdstrike (bird-aircraft collision) risk. Gulls are the most frequently struck birds in WA (FAA 2010).

Gulls cause damage at livestock feeding facilities by congregating in large numbers to consume livestock feed. In addition to the feed consumed, such feeding strategies may present disease threats to livestock as well. Williams et al. (1977) and Johnston et al. (1979) reported that gulls can transmit salmonella to livestock through droppings and

contaminated drinking water. Gulls also cause damage by defecating on equipment and other structures, which can accelerate corrosion of metal components and is generally considered an unsightly nuisance and potential health hazard for the feedlot operators and their personnel.

Although gulls do not generally feed on agricultural crops, they do cause damage. California gulls (*Larus californicus*) and ring-billed gulls (*L. delawarensis*) are known to feed on ripening cherries in orchards. In addition, there may be the threat of bacterial contamination of fruit or vegetable crops due to accumulation of droppings, particularly if gulls have recently fed or loafed at landfills or sewage treatment plants. In agricultural settings, there may be risk to the gulls themselves, through contact with agricultural chemicals.

Research has shown that gulls carry various species of bacteria such as *Bacillus* sp., *Clostridium* sp., *Campylobacter* spp., *Escherichia coli*, *Listeria* spp., and *Salmonella* spp. (MacDonald and Brown 1974, Fenlon 1981, Butterfield et al. 1983, Monaghan et al. 1985, Norton 1986, Vauk-Hentzelt et al. 1987, Quessy and Messier 1992). Transmission of bacteria from gulls to humans is difficult to document; however, Reilly et al. (1981) and Monaghan et al. (1985) suggested that gulls were the source of contamination for cases of human salmonellosis. Radhouani et al. (2010) documented gulls carrying strains of antibiotic-resistant bacteria. Contamination of public water supplies from gull feces has been stated as the most plausible source for disease transmission (*e.g.*, Jones et al. 1978, Hatch 1996). Gull feces has also been implicated in accelerated nutrient loading of aquatic systems (Portnoy 1990), which could have serious implications for municipal drinking water sources.

2.2.4 Terns

In damage situations, terns are generally found damaging aquaculture and feeding on T&E salmonid smolt at dams and hatcheries. Increases in tern colonization in western WA have impacted rooftops and human health and safety similar to gull populations described above.

Caspian terns (*Sterna caspia*) are one of the primary avian predators of juvenile salmonids in the Columbia River Basin. Caspian terns were first observed nesting in the Columbia River estuary in 1984. Approximately 37% of the North American Caspian tern population nested in Pacific coastal areas in 2002, with the majority concentrated in one colony in the Columbia River Estuary, comprising the largest Caspian tern colony in the world [Bird Research Northwest (BRN) online]. USFWS, USACE, WDFW, and ODFW developed an EIS studying the impacts of terns throughout California, Oregon, Washington, and British Columbia and include increasing nesting habitat throughout the Pacific Coast and western states in effort to disperse this colony to other areas in western North America (USFWS 2010 online).

Additional, smaller Caspian tern colonies exist throughout the Columbia River Basin. Current and historic colonies have been located at Crescent Island, Three Mile Canyon Island, and Rock Island. Data from Caspian tern colonies in the mid-Columbia River

show that tern depredation on salmonid smolt, especially steelhead smolt, can be substantial[13] and that there is a strong correlation between increased predation of smolt and the operations of the hydroelectric system (Antolos et al. 2005).

WS has implemented nonlethal BDM measures to offset damage by Caspian terns and does not propose to conduct lethal damage management for Caspian terns.

2.2.5 Cormorants, Mergansers, and Herons

WS encounters two cormorant species causing damage in WA, double-crested cormorant (*Phalacrocorax auritus*) and pelagic cormorant (*P. pelagicus*). Double-crested cormorants damage natural resources, aquaculture, marinas, boat docks, shipyards, bridges, electrical transmission structures, and other property. Damage to property and structures, such as boat docks and bridges, occurs in the form of fecal and nesting materials accumulating on and corroding surfaces and structures. Damage to natural resources occurs at dams and hatcheries where cormorants depredate on fish stocks and juvenile salmonids. Increasing double-crested cormorant populations throughout the Columbia Basin are a growing concern for fisheries managers, as cormorants prey on juvenile salmonids. While cormorants are opportunistic feeders and do not specifically target salmonids, where predation does occur, substantial numbers of smolt can be consumed (BRN online). Increasing population trends through the Columbia Basin are thought to reflect the post-DDT era recovery of the Pacific Coast cormorant populations, along with protection under MBTA beginning in 1972 (BRN online). Pelagic cormorant damage has occurred primarily at marinas, boat docks, shipyards, and bridges in marine environments.

Common mergansers (*Mergus merganser americanus*) are piscivorous waterfowl that impact natural resources in WA. Common mergansers are known predators of salmonid smolt and under certain conditions may significantly impact migrating salmonid populations (Major et al. 2002). Mergansers rank among the most efficient predators of juvenile salmon (Wood 1987). Wood (1987) noted that mergansers have been documented to feed on salmonids where they are conspicuous relative to other species. Mergansers also cause damage at fish hatcheries and aquaculture facilities by feeding on, injuring, and stressing fish as a result of their predatory behaviors.

Great blue herons and green herons (*Butorides virescens*) cause damage at hatcheries and aquaculture facilities by feeding on, injuring, and stressing fish. Great blue herons depredate T&E salmonids at dams in the Columbia and Snake Rivers. Great blue herons also defecate on boats, docks, and marinas, causing human health and safety concerns and property damage complaints. The presence of great blue herons on airfields is a significant concern for aviation safety (birdstrikes).

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[13] The predation rate by Crescent Island terns on steelhead smolt which migrated through the dams in the water (as opposed to being transported around the dams) was as high 12.4% in 2001,which was similar to the predation rates on PIT-tagged smolt in the Columbia River estuary (Antolos et al. 2005).

2.2.6 Passerines

Native passerines are not generally involved in human-wildlife conflicts; however there are a few exceptions where WA WS conducts BDM to alleviate damages or potential damages. Ravens are commonly encountered at airports and are involved in depredations on new born livestock. Other commonly encountered injurious passerines include northern flickers (*Colaptes auratus*), house finches, and American robins. Flickers are commonly associated with damage to homes because of their propensity for drilling into siding. American robins and house finches are commonly encountered depredating on berry and fruit crops.

WS assists state agencies with preventing cliff swallows (*Petrochelidon pyrrhonota*) from nesting on bridges prior to construction or maintenance projects. In some cases, nests may already be present by the time a request for assistance is received. In these cases, WS may be required to remove swallow nests and eggs before construction or maintenance project can continue. Failure to take action could lead to critical safety projects being uncompleted and delays costing tens of thousands of dollars.

2.2.7 Shorebirds

Shorebirds in Washington have resident and migrant populations (Larsen et al. 2004). The estuaries in the northern Puget Sound provide some of the highest counts of shorebirds throughout the state, with estimates exceeding 170,000wintering shorebirds in WA (Larsen et al. 2004). Shorebirds are rarely encountered in human-wildlife conflicts. The primary exception is where shorebirds loaf, feed, and nest on airports.

2.2.8 Raptors

Nationwide, raptors are the fourth most common group struck by aircraft, making them one of the most hazardous birds on airfields. Their tendencies to hover and soar frequently place them in the paths of aircraft. Species commonly encountered at airports include red-tailed hawks (*Buteo jamaicensis*), northern harriers (*Circus cyaneus*), and bald eagles (*Haliaeetus leucocephalus*). Nesting activity on airports increases risk to aviation safety, because adults increase hunting and flight activity while building nests and rearing young. Raptor nests on communication towers, bridges, utility poles, and other structures may impede or prevent maintenance.

2.2.9 Introduced and Invasive Species

European starlings, English sparrows, feral pigeons, and other feral birds are not protected by USFWS or WDFW and those species, eggs, and nests may be removed without permits when causing damage. EO 13112 on invasive species directs federal agencies to use their programs and authorities to prevent the spread or to control populations of invasive species that cause economic or environmental harm or harm to human health.

These species are found throughout most of WA, in urban and agricultural settings, and cause damage to structures, natural resources, and agriculture, and threaten human health and safety through fecal contamination and hazardous presence on airfields.

2.3 T&E Species in Washington

Washington has 60 state and federally listed T&E animal species (Table 2.4). WA WS reviewed the list of species and found that for all but the salmonid species, the Proposed Action will have "no effect". Salmonids will be benefitted by the Proposed Action and WS determined that this action "may affect, not likely to adversely affect" salmonids.. In 2003, NMFS concurred with this finding regarding this scope of activities between river mile 395 and 517 of the Columbia River. WS will reconsult with NMFS to request their concurrence with our "may affect, not likely to adversely affect" determination.

Table 2.4. State and Federally Listed Species in Washington[14].

Species	*Scientific Name*	Animal Type	State Status	Federal Status
Oregon spotted frog	*Rana pretiosa*	Amphibian	SE	FC
Northern leopard frog	*Rana pipiens*	Amphibian	SE	FCo
American white pelican	*Pelecanus erythrorhynchos*	Bird	SE	none
Greater Sage-grouse	*Centrocercus urophasianus*	Bird	ST	FC
Streaked horned lark	*Eremophila alpestris strigata*	Bird	SE	FC
Brown pelican	*Pelecanus occidentalis*	Bird	SE	FCo
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus*	Bird	ST	FCo
Ferruginous hawk	*Buteo regalis*	Bird	ST	FCo
Short-tailed albatross	*Diomedea albatrus*	Bird	SC	FE
Marbled murrelet	*Brachyramphus marmoratus*	Bird	ST	FT
Northern Spotted Owl	*Strix occidentalis*	Bird	SE	FT
Snowy plover	*Charadrius alexandrinus*	Bird	SE	FT
Sandhill crane	*Grus Canadensis*	Bird	SE	none
Upland sandpiper	*Bartramia longicauda*	Bird	SE	none
Mardon skipper	*Polites mardon*	Butterfly/Moth	SE	FC
Taylor's checkerspot	*Euphydryas editha taylori*	Butterfly/Moth	SE	FC
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	Butterfly/Moth	SE	FT
Bocaccio rockfish	*Sebastes paucispinis*	Fish	SC	FE
Chinook salmon (Upper Columbia Sp)	*Oncorhynchus tshawytscha*	Fish	SC	FE
Sockeye salmon (Snake R.)	*Oncorhynchus nerka*	Fish	SC	FE
Bull trout	*Salvelinus confluentus*	Fish	SC	FT
Canary rockfish	*Sebastes pinniger*	Fish	SC	FT
Chinook salmon (Lower Columbia)	*Oncorhynchus tshawytscha*	Fish	SC	FT
Chinook salmon (Puget Sound)	*Oncorhynchus tshawytscha*	Fish	SC	FT
Chinook salmon (Snake R. Fall)	*Oncorhynchus tshawytscha*	Fish	SC	FT
Chinook salmon (Snake R. Sp/Su)	*Oncorhynchus tshawytscha*	Fish	SC	FT
Chum salmon (Hood Canal Su)	*Oncorhynchus keta*	Fish	SC	FT
Chum salmon (Lower Columbia)	*Oncorhynchus keta*	Fish	SC	FT
Coho salmon (Lower Columbia/SW WA)	*Oncorhynchus kisutch*	Fish	none	FT
Eulachon	*Thaleichthys pacificus*	Fish	SC	FT
Green sturgeon	*Acipenser medirostris*	Fish	none	FT
Sockeye salmon (Ozette Lake)	*Oncorhynchus nerka*	Fish	SC	FT
Steelhead (Lower Columbia)	*Oncorhynchus mykiss*	Fish	SC	FT
Steelhead (Middle Columbia)	*Oncorhynchus mykiss*	Fish	SC	FT
Steelhead (Puget Sound)	*Oncorhynchus mykiss*	Fish	none	FT

[14] State Endangered (SE), State Threatened (ST), Federally Threatened (FT), Federally Endangered (FE), State Candidate (SC), Federal Candidate (FC), Federal Species of Concern (FCo).

Species	*Scientific Name*	Animal Type	State Status	Federal Status
Steelhead (Snake River)	*Oncorhynchus mykiss*	Fish	SC	FT
Steelhead (Upper Columbia)	*Oncorhynchus mykiss*	Fish	SC	FT
Yelloweye rockfish	*Sebastes ruberrimus*	Fish	SC	FT
Fisher	*Martes pennant*	Mammal	SE	FC
Mazama (Western) pocket gopher	*Thomomys mazama*	Mammal	ST	FC
Tacoma pocket gopher - Mazama	*Thomomys mazama tacomensis*	Mammal	ST	FC
Sea otter	*Enhydra lutris*	Mammal	SE	FCo
Western gray squirrel	*Sciurus griseus*	Mammal	ST	FCo
Black right whale	*Balaena glacialis*	Mammal	SE	FE
Blue whale	*Baleonoptera musculus*	Mammal	SE	FE
Columbian white-tailed deer	*Odocoileus virginianus leucurus*	Mammal	SE	FE
Fin whale	*Baleonoptera physalus*	Mammal	SE	FE
Gray wolf	*Canis lupus*	Mammal	SE	FE
Humpback whale	*Megaptera novaeangliae*	Mammal	SE	FE
Killer whale	*Orcinus orca*	Mammal	SE	FE
Pygmy rabbit	*Brachylagus idahoensis*	Mammal	SE	FE
Sperm whale	*Physeter macrocephalus*	Mammal	SE	FE
Woodland caribou	*Rangifer tarandus*	Mammal	SE	FE
Grizzly bear	*Ursus arctos*	Mammal	SE	FT
Lynx	*Lynx Canadensis*	Mammal	ST	FT
Steller sea lion	*Eumetopias jubatus*	Mammal	ST	FT
Western pond turtle	*Actinemys marmorata*	Reptile	SE	FCo
Leatherback sea turtle	*Dermochelys coriacea*	Reptile	SE	FE
Green sea turtle	*Chelonia mydas*	Reptile	ST	FT
Loggerhead sea turtle	*Caretta caretta*	Reptile	ST	FT

American White Pelican

American white pelicans (*Pelecanus erythrorhynchos*) are state-endangered piscivorous birds which are occasionally observed feeding on smolt at hydroelectric facilities. Nesting colonies of American white pelicans were extirpated from WA in the early 1980's. A nesting colony of white pelicans was re-established on Badger Island in 1997 in the upper Columbia River (BRN online). In 2010 white pelicans were documented nesting in small numbers at two locations on the Columbia River (J. Hoskins, USFWS, pers. comm. 2010). Pelicans are routinely seen congregating at outfalls where salmon smolt are concentrated. Passive Integrated Transponder (PIT) tag recoveries from the Badger Island pelican colony show that less than one PIT-tagged smolt was consumed per nesting adult. This is a low number compared to other piscivorous birds, such as cormorants which consumed 16.2-16.5 PIT-tagged smolt per nesting adult in two colonies (BRN online). While their take of salmon smolt is seemingly low, they may learn to use the unnaturally susceptible smolt as a greater component of their diets, or have a greater impact as their numbers continue to recover. There is concern that this species could cause damage to listed fish species in the future, and WS will coordinate with WDFW in managing pelican damage.

CHAPTER 3 ALTERNATIVES AND METHODS

3.1 Introduction

Alternatives were developed for consideration using the WS Decision Model (Slate et al. 1992), *"Methods of Control*" (Appendix J in USDA 1997), and the *"Risk Assessment of Wildlife Damage Control Methods Used by the USDA Animal Damage Control Program"* (Appendix P in USDA 1997). Four alternatives were recognized, developed, and analyzed in detail and three alternatives (Section 3.3) were considered but not analyzed in detail with rationale.

3.2 Description of Alternatives Analyzed in Detail

3.2.1 Alternative 1 – Continue the Current WA WS Bird Damage Management Program, Nonlethal Preferred Over Lethal Control (No Action/Preferred Alternative).

Alternative 1 is the "No Action" Alternative. The "No Action" Alternative is a procedural NEPA requirement (40 CFR 1502.14(d)), and is a viable and reasonable alternative that could be selected. This alternative is used as the baseline for comparison with the other alternatives. Therefore, information and descriptions provided under this alternative and under the analysis of its possible environmental effects may be extended to the other alternatives. WA WS provides assistance statewide, including but not limited to requests for assistance in natural resource, human health and safety, property, and agricultural protection. Management methods would be similar to those currently used but could include new technology or methods as they are developed and proven effective. While WS cannot anticipate everywhere it may be requested to work, this EA analyzes the effects from existing actions while trying to forecast potential needs for assistance and analyzes the impacts from those potential actions. Substantial changes or additions to the current program would be dependent on the addition of funds and support of property owners and other agencies and would be subject to further NEPA analysis, as appropriate.

This alternative consists of the current statewide program of adaptive IWDM TA and operational BDM on federal, state, county, city, and private lands under Cooperative Agreement, Agreement for Control, or other comparable documents. Preference is given to practical and effective nonlethal methods when determining the damage management strategy (WS Directive 2.101). However, not all nonlethal methods are practical and effective for every damage situation. The current program employs methods specific to the risk/level of damage being caused and species involved. Operations under this alternative are directed at alleviating damage and not intended to control populations of any native species[15].

[15] In damage situations involving invasive, deleterious exotic, or other non-native species, eradication may be a desired goal (locally or state-wide) as directed by EO 13112. Any efforts towards eradication of such species would be conducted in cooperation with or at the request of the appropriate state and federal wildlife management agencies.

WS uses the most effective and biologically sound damage management methods (*i.e.*, IWDM) to resolve damage caused by birds. In general terms, BDM is comprised of practical and effective methods to resolve a particular wildlife problem. The methods may include recommending the alteration of habitat and cultural practices, exclusion devices, nonlethal harassment, and/or lethal removal (Appendix C). Methods are implemented at the field level according to WS Directives 2.101 and 2.105, through the WS Decision Model (Slate et al. 1992), and guided by permits, laws and regulations, and consultations. WS BDM activities are coordinated, when appropriate, with the USFWS and WDFW to avoid adverse effects.

3.2.2 Alternative 2 – Implement All Nonlethal Methods Before Using Lethal Methods

Alternative 2 would require that all nonlethal methods found in Appendix C be implemented before any lethal methods are used by WS, replacing the professional judgment applied under the WS Decision Model used in Alternative 1. This alternative differs from Alternative 1 in that it would require WA WS to use every nonlethal method found in Appendix C and find them to be inadequate/ineffective for each damage situation before lethal methods could be implemented. Even if nonlethal methods are determined to be inappropriate or ineffective, they must be implemented before lethal actions are used. The only exception when lethal control may be applied first, under this alternative, would be instances where it is necessary to resolve an immediate life threatening situation.

3.2.3 Alternative 3 - Technical Assistance BDM Program Only

WS would not conduct operational BDM activities in WA. If requested, WS would only offer TA. Alternative 3 is a modification of Alternative 1 (Nonlethal Preferred), wherein no operational BDM would be provided by WS. However, WS could recommend operational BDM, but it would be implemented by the affected agency or resource owner (*e.g.*, home or business owner). WS would use the WS Decision Model to determine recommendations.

3.2.4 Alternative 4 - No WS BDM Program

This alternative would terminate WS' role in BDM in WA. Affected agencies and resource owners would need to contact other wildlife management agencies/service providers or would be left to their own devices to stop/reduce damage caused by birds.

3.3 Alternatives Eliminated from Further Consideration

The following alternatives were evaluated and eliminated from further consideration.

3.3.1 Lethal Methods Only Alternative

The Lethal Methods Only Alternative was analyzed in USDA (1997). This alternative would require WS to attempt to reduce or alleviate bird damage or the threat of damage through strictly lethal means. This alternative was eliminated for being unrealistic and socially and environmentally unacceptable and would not comply with the WS Decision Model (Slate et al. 1992).

3.3.2 Eradication of Native Bird Species Alternative

An eradication alternative would direct all WS Program efforts toward total elimination of problematic or nuisance birds in cooperating counties or larger defined areas in WA. The eradication of native damaging birds in WA is not a desired goal of state or federal wildlife management agencies, including WS. Eradication as a general objective for BDM will not be considered by WS in detail because eradication of birds in WA does not fall within the mission of WS and would violate state and federal laws.

3.3.3 Wildlife Damage Must Be an Accepted Loss Alternative

WS is aware that some people feel that BDM should not be allowed until economic losses become unacceptable. Although some loss of resources to wildlife can be expected and tolerated, WS has a legal obligation to respond to requests for wildlife damage management, and it is WS policy to aid each requestor to minimize losses. WS uses the Decision Model to determine appropriate strategies.

In a ruling for the Southern Utah Wilderness Alliance, et al. versus Hugh Thompson, Forest Supervisor for the Dixie National Forest, et al., the U.S. District Court of Utah upheld the determination that a wildlife damage management program may be established based on the threat of damage. In part, the court found that a forest supervisor need only show that the threat of damage (from predators) exists in order to establish a need for IWDM (Civil No. 92-C-0052A, 20 January 1993). Thus, there is precedence for conducting damage management activities when the threat of damage is present.

3.4 BDM Strategies Used by WA WS

BDM strategies vary according to the resource being protected, species involved, location of the damage, time of year, and other factors. However, WS damage management efforts are site-specific and targeted to reduce the specific damage problem.

During more than 90 years of resolving wildlife damage problems, WS has considered, developed, and used numerous methods to reduce damage problems (USDA 1997). WS' efforts include research and development of new methods and implementation of effective strategies to reduce and prevent wildlife damage. WS employs different strategies to reduce wildlife damage problems, commonly referred to as IWDM. IWDM is the implementation and application of safe and practical methods to prevent and reduce damage caused by wildlife based on local problem analyses and the informed judgment of trained personnel. The WS Program applies IWDM to reduce damage using the WS Decision Model (Slate et al. 1992, Section 1.1.2). The philosophy behind IWDM is to implement effective management techniques, in a cost-effective manner while minimizing the potentially harmful effects to humans, target and non-target species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques for each specific situation. IWDM may incorporate cultural practices, localized habitat and animal behavior modification, removal of individual animals, local population reduction, or any combination of these, depending on the characteristics of the specific damage problem.

3.4.1 Educational Efforts

Education is an important element of WA WS program activities because wildlife damage management is about finding balance and coexistence between the needs of people and needs of wildlife. In addition to the routine dissemination of recommendations and information to individuals or organizations sustaining damage, lectures, instructional courses, and demonstrations are provided to producers, homeowners, state and county agents, colleges and universities, and other interested groups. WS frequently cooperates with other agencies in educational and public information efforts. Additionally, WS personnel and scientists with the WS NWRC routinely provide technical papers at professional meetings and conferences so that WS personnel, other wildlife professionals, and the public are periodically updated on recent developments in damage management technology, programs, laws and regulations, and agency policies.

3.4.2 Technical Assistance (TA)

TA is defined as providing advice, recommendations, information, equipment, literature, instructions, and materials to assist others in preventing or reducing wildlife damage and in understanding BDM principles and techniques. Explanation of the biology, behavior, and population ecology of the species responsible for damage is occasionally sufficient to satisfy the resource owner's information needs.

Recipients of WS TA are responsible for the legal and responsible implementation of recommended damage management actions. The WS program has no regulatory authority or control of the actions taken by others.

3.4.3 Operational Bird Damage Management

Operational BDM is field activity conducted by WS personnel. It is generally applied when the problem cannot reasonably be resolved by TA or when the professional skills of WS employees are required for effective problem resolution. Operational BDM would only be conducted upon request and after written authorization from the landowner, cooperator, or other authorized official(s) is obtained. BDM methods are detailed in Appendix C.

3.4.3.1 Preventive Bird Damage Management

Preventive BDM is the practice of applying damage management strategies before damage occurs. Preventive BDM is based on historical problems and the probability of the damage recurring or an imminent threat to human health or safety. As requested, WS personnel would take action to prevent historical losses from recurring or reduce the risk of potential losses from occurring. Some examples include the harassment and/or removal of birds or nesting materials from rooftops near ventilation intakes before they have caused damage or where they threaten human health and safety at airports.

3.4.3.2 Corrective Bird Damage Management

Corrective BDM is the practice of applying damage management to stop or reduce existing losses. As requested, WS personnel take appropriate action (*e.g*., harass, remove, etc.) towards birds when damage is occurring. WS does not implement BDM for population control of native bird species.

3.4.4 Research and Development

The NWRC functions as the research arm of WS by providing scientific information for the development and improvement of biologically-sound wildlife damage management methods. The NWRC, under this EA analysis, could study and develop additional BDM methods to reduce bird damage and protect resources. As new methods are developed and proven effective they could be incorporated into the current WA BDM program.

3.5 Minimization Measures and SOPs for BDM Techniques

Minimization measures are any feature of an action that serves to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS program, nationwide, uses many minimization measures, and these are discussed in detail in Chapter 5 of USDA (1997). The following measures apply to some or all of the alternatives analyzed for the WA WS program, as indicated by an "X" in the column on the right side of Table 3-1.

Alternative 1 – Continue the Current WA WS Bird Damage Management Program (No Action/Proposed Action)
Alternative 2 – Implement All Nonlethal Methods Before Using Lethal Methods
Alternative 3 - Technical Assistance BDM Program Only
Alternative 4 - No WS BDM Program

Table 3-1. Minimization Measures Implemented for Each Alternative	Alternatives 1	2	3	4
The WS Decision Model is used to identify the most effective biologically and ecologically sound BDM strategies and their impacts.	X		X	
Research on selectivity and humaneness of management practices would be monitored and adopted as appropriate.	X	X	X	
The use/recommendation of capture equipment would conform to current laws and regulations administered by USFWS, WDFW and WS Policy Directives (APHIS 2010).	X	X	X	
Captured non-target animals would be released unless it is determined by the WA WS personnel that the animal would not survive.	X	X		
WS personnel are trained and experienced on all BDM methods to select the most appropriate method to reduce damage while minimizing take of target animals while excluding non-target species. Training details are outlined in the WS Policy Manual (APHIS 2010).	X	X		
WS Specialists would recommend the use of traditional and newly developed proven non-lethal methods.	X	X	X	
Euthanasia procedures approved by the American Veterinary Medical Association (AVMA 2007). These guidelines incorporate input from several professional societies and international authorities (*e.g.* American Ornithologists Union, American Society of Mammalogists, American Association of Avian Pathologists, World Organization for Animal Health, International Association of Fish and Wildlife Agencies).	X	X		
Operational BDM conducted on public lands would be coordinated with the management agency.	X	X		
WA WS' take is provided to the USFWS and WDFW, and WS considered the statewide hunter harvest (WA WS take and other take) when estimating WS' impact on wildlife species.	X	X		
Management actions would be directed toward localized populations and/or individual offending animals, dependent on the magnitude of the problem.	X	X		
Potential impacts on T&E species in WA have been assessed. No adverse effects are likely to occur from WS actions (USFWS 2010, WS 2010).	X	X		

CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 Environmental Consequences

NEPA requires federal agencies to identify and assess the reasonable alternatives to a proposed action that will avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1500.2e). This chapter provides the information needed for making informed decisions for selecting the appropriate alternative or meeting the need for action and purpose of the proposed action. It analyzes the environmental consequences of each alternative analyzed in detail in Chapter 3 in relation to the issues identified for detailed analysis.

The following criteria will aid in determining the environmental consequences in regards to each issue (Section 4.2) to determine if the impacts are greater than, less than, or the same as the proposed alternative.

4.1.1 Non-significant Impacts

Soils, geology, minerals, flood plains, visual resources, air quality, or prime and unique farmlands within WA are not expected to be significantly affected by any of the alternatives analyzed. These resources will not be analyzed further.

4.1.2 Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of resources are expected, other than minor uses of fuels for motor vehicles and other similar materials. These will not be discussed or analyzed further.

4.1.3 Evaluation of Significance of Cumulative and Unavoidable Impacts

Each issue analyzed in detail is evaluated under each alternative and the direct, indirect, and cumulative impacts are analyzed. NEPA regulations describe the elements that determine whether or not an impact is *"significant*." Significance is dependent upon the context and intensity of the action. The following factors were used to evaluate the significance of impacts in this EA that relate to context and intensity (adapted from USDA 1997) for this proposal.

4.1.3.1 Magnitude of the Impact (size, number, or relative amount of impact)

Magnitude is defined in USDA (1997) as ". . . a measure of the number of animals killed in relation to their abundance" and may be determined either quantitatively or qualitatively. Quantitative analysis is used whenever possible as it is more rigorous and is based on allowable harvest levels, abundance estimates, and harvest data. Qualitative analysis is based on abundance trends and harvest data or trends and modeling. Sport harvest levels were obtained from WDFW and USFWS. In the discussion that follows, *"Other Harvest"* refers to the known other take, sport harvest, and other information obtained from the WDFW and USFWS. "*Total Harvest"* refers to the sum of the birds removed by WA WS combined with the "*Other Harvest*."

4.1.3.2 Duration and Frequency of the Impact

Duration and frequency of BDM in WA is variable. Abiotic and biotic factors affecting wildlife behavior affect the duration and frequency of BDM activities conducted by WS in WA. BDM in specific areas may be long duration projects, but the frequency of individual actions may be variable depending upon any number of factors affecting the behavior of the animals that are causing damage and the location of the potential damage. BDM would only be conducted by WS when a request for assistance is received and a demonstrated need is present.

4.1.3.3 Geographic Extent

BDM could occur anywhere in WA where damage management has been requested, agreements for such actions are in place, and action is warranted as determined by implementing the WS Decision Model (Slate et al 1992). Actions would be limited to areas receiving damage from birds, areas with historical bird damage, or where a threat of damage exists.

4.2 Issues Analyzed in Detail

The following environmental issues were identified as relevant to this EA and analyzed in detail in Section 4.4.

- Effect of methods on non-target and ESA-listed species.
- Effect of methods on populations of target species.
- Effectiveness of BDM Program in Washington.
- Humaneness of methods.

4.3 Issues Not Analyzed in Detail with Rationale

4.3.1 WS' Impact on Biodiversity

WA WS does not conduct BDM to eradicate any native wildlife species or control their populations. WS operates according to federal and state laws and regulations (and management plans thereof) enacted to ensure species viability. The effects of the current WS program on biodiversity are minor and not significant nationwide, statewide, or region-wide (see Section 4.4.1.2). WS operates on an extremely small percentage (0.4%) of the land area of WA[16] and WS' take of native wildlife species is a small proportion and insignificant to the viability and health of the total population. There is no evidence to suggest that WA WS BDM, as proposed, would have any adverse direct, indirect, or cumulative effects on biodiversity.

4.3.2 Appropriateness of Preparing an EA (Instead of an EIS)

Some individuals might question whether preparing an EA for the state of WA would meet the NEPA requirements for site specificity. If a determination is made through

[16] Usually in areas with human developments *(e.g.,* agriculture, airports, landfills and waste transfer stations, utilities, industrial areas, cities, etc.)

this EA that the proposed action would have a significant environmental impact, then an EIS would be prepared. In terms of considering cumulative impacts, one EA analyzing impacts for the entire state may provide a better analysis than multiple EA's covering smaller zones. In addition, WA WS only conducts BDM in a very small area of the State (0.4%) where damage is occurring or likely to occur.

4.3.3 Cost Effectiveness of Bird Damage Management

CEQ does not require a formal, monetized cost-benefit analysis to comply with NEPA (40 CFR 1502.23) and consideration of this issue is not essential to making a reasoned choice among the alternatives being considered. USDA (1997, Appendix L) states:

"Cost effectiveness is not, nor should it be, the primary goal of the APHIS WS program. Additional constraints, such as the environmental protection, land management goals, and others, are considered whenever a request for assistance is received. These constraints may increase the cost of the program while not necessarily increasing its effectiveness, yet they are a vital part of the APHIS WS Program."

An analysis of cost-effectiveness in many BDM situations is exceedingly difficult or impossible to perform because the value of benefits is not readily determined. For example, the potential benefit of reducing bird risks at airports or eliminating pigeons from nesting in industrial buildings could reduce birdstrikes or incidences of illness among unknown numbers of building users. Since some birdstrikes or bird-borne diseases are potentially fatal, or severely debilitating, the value of the benefit may be high. However, no studies with and without BDM have been conducted, and, therefore, the number of cases *prevented* by effective BDM is not possible to estimate.

4.3.4 Bird Damage Management 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 may 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, 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, airport managers, 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.

4.3.5 Effects from the Use of Lead Ammunition in Firearms

Questions have arisen about the deposition of lead into the environment from ammunition used in BDM. To address lead exposure, WA WS complies with USFWS requirements for the use of non-toxic shot pursuant to USFWS depredation permits and depredation orders. Additionally, WA WS preferentially uses non-toxic shot for the

control of non-migratory or non-native birds unless necessary to alleviate safety concerns (*e.g.,* ricochets).

Where appropriate, some birds may be taken with rifles or other firearms using lead bullets. Birds taken with lead bullets are retrieved and disposed to prevent access by scavengers. A minimal amount of lead from bullets may enter the environment if a bullet passes through a bird, a miss occurs, or the carcass cannot be retrieved.

In an ecological risk assessment of lead shot exposure to non-waterfowl birds, the ingestion of lead shot, rather than just contact with lead, was identified as the concern (Kendall et al. 1996). Birds most commonly ingest lead shot in areas where it has accumulated over time from extensive or repetitive shooting activities. WS' use of lead is minimal and randomly distributed throughout the state, and is not concentrated in small, specific areas like shooting ranges or wetlands. WS abides by state and federal regulations regarding where and when lead shot or bullets may be used. Based on current information, lead deposited in the environment, in such low levels, does not pose a risk of exposure or water contamination.

4.3.6 Perception of Aesthetics

Aesthetics is the philosophy dealing with the nature of beauty or the appreciation of beauty. Therefore, aesthetics is subjective in nature, dependent on what an observer regards as beautiful or distasteful. The mere knowledge that wildlife exists is a positive benefit to many people (Fulton et al. 1996). Human dimensions of wildlife damage management include identifying how people are affected by problems or conflicts between them and wildlife, attempting to understand people's reactions, and incorporating this information into policy and management decision processes and programs (Decker and Enck 1996, Decker and Chase 1997). Aesthetically speaking, a passerby may view a large flock of feeding birds with great delight, whereas another person (*e.g.,* property owner experiencing wildlife damage) may view the same birds with displeasure.

Some bird species have increased in abundance to where their current populations are much higher than they were historically, and are often the result of human-induced environmental changes. Conover (2002) describes species whose current population exceeds historical levels due to human-caused environmental changes as being "anthropogenic abundant." Many native birds we think of as common due to their current abundance are anthropogenic abundant and they often cause environmental changes, but when these changes are not to society's liking, it is considered environmental degradation or destruction (Conover 2002). For instance, many anthropogenic abundant species have contributed to the decline of some native species, including endangered species, through excessive predation, competition, or disease transmission (Goodrich and Buskirk 1995). The exponential increase of urban geese in Seattle, which occurred in the 1990s, provides a recent example of an anthropogenically abundant species.

"Wildlife acceptance capacity" is the limit of human tolerance for wildlife or the maximum number of a given species that can coexist compatibly with local human

populations (Decker and Purdy 1988). Wildlife acceptance capacity is also known as the "cultural carrying capacity." These terms are important because they define the sensitivity of a local community to a specific wildlife species. For any given damage situation, there will be varying thresholds by those directly and indirectly affected. This threshold of damage or potential damage is a primary limiting factor in determining the wildlife acceptance capacity. The wildlife acceptance capacity reflects the acceptance of one key constituency for a species at a given point in time, thus, different key constituency groups can simultaneously have different wildlife acceptance capacities that reflect their particular set of pertinent limiting factors relative to a particular wildlife population (Decker and Purdy 1988).

WS recognizes the aesthetic importance of wildlife and associated viewing and recreational opportunities. Under the current program there may be a local, site-specific effect on people's opportunities to view some individual birds or flocks. However, bird populations as a whole have not been negatively affected by WA WS, and there has been no measurable decline in public viewing opportunities. This trend would be expected to continue.

4.4 Alternatives Analyzed in Detail

4.4.1 Alternative 1: Continue the Current WS BDM Program, with Nonlethal Preferred Over Lethal Control (No Action/Proposed Alternative)

Alternative 1 is the "No Action" Alternative, which is a procedural NEPA requirement [40 CFR 1502.14(d)]. This alternative would continue the current program, an adaptive IWDM approach, which includes the use of a combination of nonlethal and lethal methods based on case-by-case situations. Nonlethal methods are preferred and used first when they are deemed practical and effective (WS Directive 2.101).

4.4.1.1 Effect of Damage Management Methods on Non-target and ESA-listed Species Non-lethal Methods

Overall, impacts to non-target species from the use of nonlethal methods would be similar to the use of nonlethal methods under any of the alternatives. Non-target species would generally be unharmed from the use of nonlethal methods under any of the alternatives since no lethal take would occur. Nonlethal methods would be available under this alternative and WS' involvement in the use of or recommendation of nonlethal methods would ensure non-target species impacts are considered under WS' Decision Model.

Only repellents registered with the EPA pursuant to FIFRA and registered for use in WA would be recommended and used by WS under this alternative, [*e.g.*, Methyl Anthranilate]. The use and recommendation of repellents by WA WS would not have negative impacts on non-target species when used according to label requirements. Most repellents are derived from natural ingredients that pose a very low risk to non-target species when exposed to or when ingested.

Lethal Methods

WS could employ and/or recommend lethal methods under the proposed alternative to alleviate damage. Lethal methods available for use to reduce damage caused by birds under this alternative would include shooting, traps, Sodium Lauryl Sulfate (SLS) and the avicides DRC-1339 and Avitrol. In addition, birds could also be euthanized once live-captured by AVMA approved methods; lethal take of live-captured birds would occur pursuant to WS Directive 2.505. Available methods and the application of those methods to resolve bird damage is further discussed in Appendix C.

Shooting would be used for lethal reinforcement and as the last step of this integrated BDM program. Lethal reinforcement is heavily prefaced with one or more forms of habitat management, exclusion, and/or harassment. In nearly every case, most bird species habituate to nonlethal methods and continue to damage or threaten damage. When this occurs, at least one individual is shot to serve as a warning to the rest of the flock; in some instances, multiple individuals are shot before the flock finally departs the area. Throughout the course of a day, the same flock, or members of that flock, may return to the site. Harassment is repeated and if the birds fail to depart, lethal reinforcement may be repeated. After several days or weeks of this, these flocks or persistent individuals generally vacate the site. Often, the bird' behavior will change and they will flush from the sight when WS vehicles approach. When this occurs, WS assumes that these birds have habituated to management, but the birds may still be present on the site whenever WS is not. It is also obvious when new birds (*e.g.,* migrants) unfamiliar with the above practices are present because these birds do not depart when WS approaches. These individuals/flocks are then conditioned just as described above.

At multiple damage locations, where WS conducts ongoing BDM programs, it is possible to have individuals or thousands of birds a day trying to use the site. It is imperative to continue to condition the birds to keep them from establishing at the site and for the reduction of damage. If some birds, particularly gulls, are allowed to persist at the site, they serve as decoys to other birds to use the site. This is why WS makes significant effort to deter and harass all birds from damage sites. Continually harassing habituated birds (without using lethal reinforcement) frequently serves to decoy in additional birds, prolong the damage experienced, and potentially results in the need for substantially more lethal reinforcement at a later time.

Birds that have habituated to WS personnel and vehicles are nearly impossible to apply lethal reinforcement upon. At many of the sites where WS has ongoing BDM programs, it is common for new birds, particularly gulls, to show up in groups of one to hundreds of birds.

The use of firearms is selective for target species since animals are identified prior to shooting; therefore, no adverse impacts are anticipated from WS' use of this method. When using pesticides, WS follows all pesticide label requirements to minimize hazards to non-target species. When required, bait sites are pre-baited and monitored for non-target species use, as outlined in the pre-treatment

observations section of the label. By acclimating target species to a feeding schedule, baiting can occur at specific times to ensure bait is quickly consumed by target species, and is unavailable to non-target species. If non-target species are observed feeding on the pre-bait, the plots are abandoned and no baiting would occur at those locations. The selection of bait type can also limit the likelihood that non-target species will consume treated bait, since some bait types are not preferred by non-target species.

Once sites are baited, they are monitored to further observe for non-target species feeding activity. If non-target species are observed feeding on bait, they are harassed from the area or the bait is removed and those sites are abandoned. When baiting is complete, any uneaten baits are picked-up and safely disposed on the same day of the treatment; no bait is left unobserved.

The methods used under Alternative 1 are selective for target species. There has been no measurable adverse effect observed on non-target species and no adverse effect on ESA-listed species. Operational damage management conducted by WA WS may include harassment, exclusion, shooting, capture and euthanasia, pesticides, and other methods discussed in Appendix C which are determined to be practical, legal, and effective.

WS initiated consultation with USFWS during the preparation of this EA to determine whether the proposed action will affect ESA-listed species.

4.4.1.2 Effect of Take on Populations of Target Species

BDM incorporates a variety of lethal and nonlethal methods (Appendix C), to reduce damage and/or risk of damage to resources. When responding to damage by native bird species, WS may use lethal reinforcement to enhance behavioral response to nonlethal methods. Lethal management is typically required when bird population densities are relatively high and nonlethal methods are ineffective or the birds have habituated to them. WA WS strives to limit take of native species of birds. For FY06 through FY10, lethal actions comprised only 1.04% of all BDM activities involving bird species (excluding feral, Depredation Order, and invasive species). In addition, through the annual federal depredation permit renewal process administered by the USFWS, WS coordinates the take of MBTA protected species with the USFWS Migratory Bird Office to ensure WS' actions will not adversely impact populations. When responding to damage by non-native, invasive, or introduced species (*e.g.*, European starlings, feral pigeons, or others), WS may use lethal methods to specifically reduce localized populations.

In the interest of preserving public safety, WS may conduct BDM involving species not anticipated in this document. One example would be airports which receive depredation permits from USFWS, monitored and renewed annually, to protect aviation and public safety. These permits allow for take of any migratory bird species (except T&E listed species and bald and golden eagles) that pose an immediate threat to aviation or human health and safety. WS may be requested to assist airports and conduct management actions under those permits at any time.

Wildlife populations are difficult to count, so WA WS uses the best available population data (be it numbers or trends) from multiple sources to attempt to accurately assess populations.

In the following analysis, the magnitude of WS' effect is measured for those species that were lethally removed during BDM actions[17]. The analysis for magnitude of effect generally follows the process described in Chapter 4 of USDA (1997), which defines magnitude as "*... a measure of the number of animals killed in relation to their abundance*." Magnitude can be determined either quantitatively or qualitatively.

WA WS take is presented as 5-year averages for activities from FY06 through FY10 (Appendix A). The analysis considers a level of take that may be necessary to sufficiently reduce damages and meet future requests for assistance. However, the numbers presented do not necessarily represent planned take. All take of migratory bird species is regulated and permitted in advance by the USFWS and any future requests for take would be reviewed and analyzed by the USFWS before the necessary permits are issued[18].

WS responds to requests for assistance and may be asked to provide assistance at any time. The level of take analyzed in this EA is higher than what is currently occurring to account for possible future requests which could include additional assistance at airports, agricultural producers, and hydroelectric facilities across WA. Under NEPA CEQ regulations, federal agencies are directed to take immediate action to secure human lives. The protection of human safety at airports is a priority for WS, so analyzing a level of potential take that facilitates that mission, while not impacting those wildlife populations, is essential although exact numbers cannot be predicted.

4.4.1.2.1 Waterfowl

Migratory waterfowl are managed and protected by the USFWS and WDFW. As part of their regulatory authority, the USFWS may issue depredation permits to WS and others to take waterfowl species. Nearly all WS take of waterfowl occurs at airports under each airport's USFWS issued depredation permit. WS expects this need to continue and will provide assistance, as requested. The majority of waterfowl species are also legally hunted in WA with seasons and bag limits set by both agencies.

There are several standards of comparison available to determine the impacts of WS activities on waterfowl populations[19]. Population estimates provide an index

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[17] Under the current USFWS permit, "up to 10 birds per species [not listed on the existing permit], excluding bald and golden eagles and T&E species, may be taken [annually], however, there is no limit on the number taken at airports in emergency situations".

[18] Species included in depredation orders or non-native, exotic species do not require permits.

[19] The primary survey to determine status of wintering waterfowl is the January Midwinter Waterfowl Survey, which is a combined effort of WDFW, ODFW, Yakama Nation, USFWS, and Canadian Wildlife Service.

for comparison from year to year, based on the application of the same methodologies, and are not a census of waterfowl populations. Harvest estimates are established using voluntary hunter-completed surveys and are provided for comparison purposes[20]. As part of the following analysis, WS consulted with WDFW regarding take of waterfowl. WDFW does not expect any adverse effects from the removal of up to 300 mallards and 50 of each other waterfowl species per year (excluding harlequin (*Histrionicus histrionicus*), brant (*Branta bernicla)*, and dusky Canada geese (*B. canadensis occidentalis*)) (Don Kraege, WDFW, pers. comm. 2010).

American Wigeon Population Impacts

The estimated average American wigeon (*Anas americana*) wintering population in WA from 2006 through 2009 was 139,519 (WDFW 2009). USFWS breeding surveys of waterfowl breeding grounds in Canada and Alaska in 2009 show that wigeon abundance was similar to 2008 and the long term average (2.5±0.1 million). Breeding Bird Survey (BBS) population trend data from 1966 to 2009 shows wigeon populations are relatively stable in WA since 1968 (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 659 and lethally removed an average of 18 wigeon per year on projects relevant to this EA. WS could take 50 wigeon per year, equal to about 0.004% of the estimated population, and would not significantly impact the distribution, abundance, or population trend of the species.

American Green-winged Teal Population Impacts

The estimated average American green-winged teal (*A. creeca*) wintering population in WA from 2006 through 2009 was 22,780 (WDFW 2009). USFWS breeding surveys of waterfowl breeding ground in Canada and Alaska in 2009 show that the population was similar to 2008 levels (3.4 ±0.2 million) and well above the long term average (USFWS 2009). BBS population trend data from 1966 to 2009 shows the green-winged teal population has been stable in WA since about 1978 (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 343 and lethally removed an average of 18 green-winged teal per year on projects relevant to this EA. Based on the yearly average, WS took 0.08% of the estimated green-winged teal wintering population in WA. Though not anticipated, WS could take up to 50 green-winged teal per year, equaling about 0.2% of the estimated population, and

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Other surveyed regions include the north Puget Sound and other key wintering areas from October through March.

[20] Survey methodology for estimating populations and harvest can be found in USFWS 2009 and Raftovich et al. 2009, accordingly.

would not significantly impact the distribution, abundance, or population trend of the species.

Bufflehead Population Impacts

The estimated average bufflehead (*Bucephala albeola*) wintering population in WA from 2006 through 2009 was 21,527 (WDFW 2009). The BBS population trend data from 1966 to 2007 shows the bufflehead population is stable in WA (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 7,785 and lethally removed an average of 11 bufflehead per year on projects relevant to this EA. Based on the yearly average, WS took less than 0.05% of the estimated bufflehead wintering population in WA. WS could take up to 50 bufflehead per year, less than 0.2% of the estimated wintering population (not all bufflehead are taken during the winter), and would not significantly impact the distribution, abundance, or population trend of the species.

Gadwall Population Impacts

The estimated average Gadwall (*A. strepera*) wintering population in WA from 2006 through 2009 was 5,568 (WDFW 2009). USFWS breeding surveys of waterfowl breeding grounds in Canada and Alaska in 2009 show that the population was similar to 2008 levels (3.1 ±0.2 million) and 73% above the long term average (USFWS 2009). BBS population trend data from 1966 to 2009 shows the gadwall population has steadily increased in WA since about 1978 (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 474 and lethally removed an average of 17 gadwall per year on projects relevant to this EA. WS could take up to 50 gadwall per year, less than1% of the estimated population (not all gadwall are taken during the winter), and would not significantly impact the distribution, abundance, or population trend of the species.

Mallard Population Impacts

The estimated average mallard (*A. platyrhynchos*) population in WA from 2006 through 2009 was 359,501 (WDFW 2009). USFWS breeding surveys of waterfowl breeding grounds in Canada and Alaska in 2009 show that the population of mallards in 2009 (8.5±0.2 million) was 13% higher than the long term average. The BBS population trend data from 1966 to 2009 shows the mallard population is stable in WA (Sauer et al. 2011).

From FY06 through FY10, WS destroyed an average of 6 mallard eggs, dispersed an average of 1,663 birds, and lethally removed an average of 122 mallards per year on projects relevant to this EA. WS could take up to 300 mallards per year, equaling 0.08% of the estimated WA population, and would not significantly impact the distribution, abundance, or population trend of the species.

Northern Shoveler Population Impacts

The estimated average northern shoveler (*A. clypeata*) wintering population in WA from 2006 through 2009 was 4,444 (WDFW 2009). USFWS breeding surveys of waterfowl breeding grounds in Canada and Alaska in 2009 show that the population was 25% above the 2008 levels (4.4 ±0.2 million) and 92% above the long term average (USFWS 2009). The BBS population trend data from 1966 to 2009 shows the shoveler population is relatively stable in WA (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 66 and lethally removed an average of 10 shovelers per year on projects relevant to this EA. WS could take up to 50 shovelers per year, less than1.3% of the estimated wintering population (not all shovelers are taken during the winter), and would not significantly impact the distribution, abundance, or population trend of the species.

Ring-necked Duck Population Impacts

The estimated average ring-necked duck (*Athaya collaris*) wintering population in WA from 2006 through 2009 was 14,364 (WDFW 2009). USFWS breeding surveys of waterfowl breeding grounds do not include ring-neck ducks in the Pacific Flyway. The BBS population trend data from 1966 to 2009 shows the ring-necked duck population is increasing in WA (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 414 and lethally removed an average of 11 ring-necked ducks per year on projects relevant to this EA. WS could take up to 50 ring-necked ducks per year, about 0.3% of the estimated wintering population (not all ring-necked ducks are taken during the winter), and would not significantly impact the distribution, abundance, or population trend of the species.

Canada Goose Population Impacts

The estimated average wintering population of Canada geese in WA from 2006 through 2009 was 44,344 (WDFW 2009). The BBS population trend data from 1966 to 2009 shows that breeding populations of Canada geese have increased since 1980 and have increased steadily over the past 30 years in WA (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 688, and lethally removed an average of 23 Canada geese per year on projects relevant to this EA[21]. WS could take up to 50 Canada geese per year, equaling about 0.11% of the estimated wintering population (not all Canada geese are taken during the winter), and would not significantly impact the abundance, distribution, or population trend of the species.

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[21] Analysis of resident Canada goose management was conducted under the USFWS Resident Canada Goose EIS.

Greater White Fronted Goose Population Impacts

The Pacific population of greater white-fronted geese (*Anser albifrons*) nests on the Yukon-Kuskokwim Delta and winter in the Central Valley of California. USFWS surveys of the breeding grounds estimated the 2009 fall population at 536,700 (USFWS 2009).

WS first noted greater white-fronted geese showing up at airports in western WA in 2008, and it may be necessary to deter this species from airports in the future. From FY06 through FY10, WS dispersed an average of 195 and lethally removed an average of one greater white-fronted goose per year on projects relevant to this EA. For analysis purposes, WS could take up to 50 greater white-fronted geese per year, equaling 0.009% of the estimated Pacific population, and would not significantly impact the distribution, abundance, or population trend of the species.

Tundra Swan Population Impacts

Tundra swans (*Cygnus columbianus*) are susceptible to lead poisoning, and large die offs have occurred, but the WA population appears stable (Seattle Audubon 2005). According to WDFW (2009), the most recent estimates of the wintering western WA tundra swan population in WA was 3,380.

From FY06 through FY10, WS dispersed an average of 79 and lethally removed an average of one tundra swan(s) per year on projects relevant to this EA. In 2008, WS first documented the presence of swans in large numbers at a military airfield in western WA, posing a highly significant threat to aviation safety. WS could take up to six tundra swans per year, equaling 0.2% of the estimated western WA wintering population, and would not significantly impact the abundance, distribution, or population trend of the species.

Trumpeter Swan Population Impacts

WA WS took no trumpeter swans (*C. buccinators*) during the analysis period. In 2008, WS documented the presence of swans in large numbers at a military airfield in western WA, posing a highly significant threat to aviation safety. The species is susceptible to lead poisoning, and large die offs have occurred, but the WA population appears stable (Seattle Audubon 2005). According to WDFW (2009), the most recent estimates of the wintering western WA trumpeter swan population in WA was 9,852. WS could take up to six trumpeter swans per year, equaling 0.06% of the estimated western WA wintering population, and would not significantly impact the abundance, distribution, or population trend of the species.

4.4.1.2.2 Gulls

Gulls comprise a migratory group that is managed and protected by the USFWS and WDFW. As part of their regulatory authority, the USFWS issues depredation permits to WS and others to take gulls to protect human health and safety, property, natural resources, and agriculture. WS expects requests to reduce gull damages to continue and will provide assistance, as requested. The numbers presented in the analysis below do not necessarily represent planned take. All take of migratory bird species is regulated and permitted in advance by the USFWS and any future requests for take would be reviewed and analyzed by the USFWS before any permits are issued.

Glaucous-winged Gull/Western Gull Population Impacts

Glaucous-winged gulls (*Larus glaucenscens*) are common residents on the Pacific Northwest coast and hybridize extensively with western gulls (*L. occidentalis*) (Hayward and Verbeek 2008). For that reason, these species along with their hybrids are considered together for this review. The North American population of glaucous-winged gulls was estimated at 380,000 breeding birds with stable population trends and western gulls were estimated at more than 77,000 with stable to increasing population trends (Kushlan et al 2002). A survey completed in the early 1980s, estimated that there were 37,000 glaucous-winged gulls/western gulls in WA. The most recent information on glaucous-winged gulls/western gulls includes estimates for colonies at Destruction Island and Protection Island in 2006 (204 and 4,483, respectively), Puget Sound except Destruction Island in 2007 (6,029) and the Columbia River Estuary in 2009 (8,073), for a total WA/Columbia River nesting population of 18,789 birds (9394 pairs). These surveys attempted include gull colonies, larger than 30 nests, nesting on buildings and structures along the shoreline, but did not capture data for "inland" colonies (USFWS unpubl. data) or small groups of nesting birds typical of inland and near-shore urban areas (USDA unpubl. data). WS has counted more than 10,000 glaucous-winged gulls at one landfill on multiple winter days.

The majority of conflicts with glaucous-winged gulls/western gulls occur in urban and suburban environments in the areas surrounding Puget Sound and along the Pacific coast, sometimes more than 15 miles inland from the nearest marine water. Inland landfills, trash transfer stations, and airports, marinas, and rooftops account for most conflicts. Most of the gulls nesting, feeding, or residing in these locations have historically escaped population inventories. The expansion of gull populations into urban areas is not a new phenomenon and has been documented since 1946 in Commencement Bay (Eddy 1982). Glaucous-winged gulls have been observed nesting at numerous ferry terminals throughout the Puget Sound and on rooftops in Bremerton and Seattle (Eddy 1982, USDA unpubl. data). WS biologists have also observed numerous small nesting populations (fewer than 30 pair) of

glaucous-winged gulls in other cities and locations (primarily rooftops) around Puget Sound that have not been inventoried in official gull surveys (MIS 2011).

The majority of WS's lethal take of glaucous-winged gulls/western gulls occurs at landfills and trash transfer stations during the fall through spring migration period (October through February) and most likely involves wintering migrants, not the local breeding population. WS estimates that between ¼ and ⅓ of the gulls removed during this time are sub-adults that are not routinely counted in any of the breeding colony surveys. This period is when WS conducted the majority of its nonlethal management efforts as well. Based on the timing of these efforts and the response of individuals and flocks to lethal reinforcement efforts, the vast majority of these birds are believed to be migrants. On average, 574 glaucous-winged gulls/western gulls were killed each year from May through August, FY06 through FY10 (Figure 4.1, MIS 2011).

Lethal reinforcement is simply the last step of an integrated control program. It is heavily prefaced with one or more forms of habitat management, exclusion, and/or harassment. In nearly every case, gulls quickly habituate to these nonlethal methods and continue to damage or threaten damage. When this occurs, at least one individual is shot to serve as a warning to the rest of the flock. In some instances, multiple individuals are shot before the flock finally decides to depart the area. Throughout the course of a day, the same flock, or members of that flock, may return. Harassment is repeated and if the birds fail to depart, lethal reinforcement is repeated. After a few days or weeks of this, these flocks or persistent individuals learn to recognize WS' presence at the damage site (vehicles as well as personnel). Often, birds will flush from the sight of WS vehicles approaching from several hundred yards away. When this occurs, WS knows that these birds have habituated to management methods and know that they may be present on the site whenever WS is not. It is obvious when new birds unfamiliar with the above practices are present because these new birds do not depart when WS approaches. These individuals/flocks must be conditioned just as described above.

At multiple damage locations where WS conducts ongoing gull damage management programs, it is possible to have individuals or thousands of gulls a day trying to use the site. It is imperative that gulls never think they can sometimes get away with being present on the damage site. If some are allowed to persist, they serve as decoys to other gulls flying by. This is why WS makes significant effort to deter and harass all gulls from damage sites.

Gulls may appear as individuals or in flocks of hundreds. If they fail to depart when WS personnel approach, they are addressed as new birds and harassed heavily. Lethal reinforcement may soon follow if they fail to depart. If all or most begin to depart, they may be considered habituated birds and harassment may be employed or an individual may be shot to reinforce that this is not an acceptable/safe area for them to loaf/feed at. Continually harassing habituated birds (without using lethal reinforcement) frequently serves to decoy in additional birds, prolong the damage experienced, and potentially results in the need for substantially more lethal reinforcement later on.

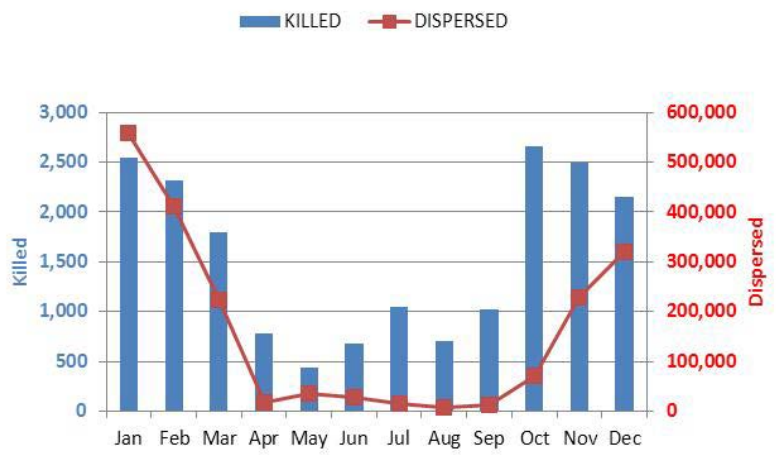

Figure 4.1. Seasonal distribution of GWGU/WEGU control efforts.

Birds that have habituated to WS personnel and vehicles are nearly impossible to apply lethal reinforcement upon. New birds, that do not respond may be shot. At many of the sites where WS has ongoing gull damage management programs, it is common for new gulls to show up in groups of one to hundreds of birds. WS has counted more than 10,000 GWGUs at one landfill on multiple winter days. Because of their response to WS vehicles and personnel, it is easy to distinguish how frequently migrating birds arrive at the damage sites and to confidently declare that most of the gulls WS takes during the months of October through March are migrants. In addition, WS estimates that between one-quarter and one-third of the gulls removed during this time are sub-adults that are not routinely counted in any of the breeding colony surveys.

Glaucous-winged gull egg control projects occur in the late spring through summer on rooftops in urban and suburban areas, usually with fewer than 12 nests per building, and adjacent to the Puget Sound (MIS 2011). While conducting their regular projects, WS biologists and specialists can identify multiple other rooftops with 1-30 nests per building and WS is not under agreement to work on any of those buildings. Therefore, WS is confident that the nests and eggs WS removes, and uncountable others, are not any of those counted during USFWS surveys and that aerial counts of rooftop nests result in the omission of significant numbers of nests.

More than 99% of the BDM actions taken by WS in the reduction of conflicts with glaucous-winged/western gulls were nonlethal. From FY06 through FY10, WS harassed an average of 387,167 glaucous-winged/western gulls, lethally removed an average of 3,749 birds, and removed an average of 3,408 eggs each year. All WS egg removal occurred on "non-natural" anthropogenic features such as rooftops and other features in urban and suburban areas. This activity serves an important role in discouraging the increasing shift in nesting into urbanized and industrial areas. Lethal take by entities other than WS did not exceed more than 200 birds per year, and would not significantly increase the cumulative effects of WS BDM on the glaucous-winged/western gull populations. The BBS shows the glaucous-winged/western gull population continues to be healthy in WA, concurrent with WS' BDM activities (Figure 4.2).

Based on the historic annual average take, anticipated projects, and the positive trend in the Washington and Western BBS Region glaucous-winged/western gull population (Sauer et al. 2011), WS could be requested to remove up to 4,100 birds and 4,500 eggs per year to protect resources. As required through the annual federal depredation permit renewal process, WS will coordinate with the USFWS Migratory Bird Office to ensure WS' actions will not adversely impact glaucous-winged/western gull populations.

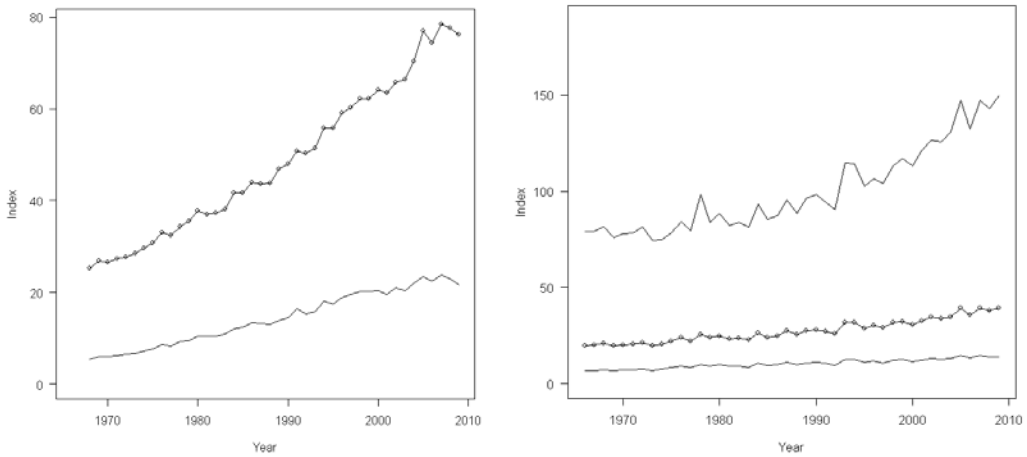

Figure 4.2 BBS Trend for Glaucous-winged Gulls in Washington (left) and the Western BBS Region (right) for 1968-2009 (Sauer et al. 2011).

Herring Gull Population Impacts

Herring gulls (*L.* argentatus) are common in WA and may hybridize with glaucous-winged gulls (Pierotti and Good 1994). WS dispersed an average of 10,581 and lethally removed an average of 68 herring gulls per year. The overall population trend for herring gulls in the western BBS region remains stable (Sauer et al. 2011). Based on the yearly average, anticipated projects, and stable population trend, WS could possibly be requested to remove up to 150 herring gulls to protect

resources, which would not impact the distribution, abundance, or population trend of the species.

California Gull Population Impacts

Winkler (1996) in the Birds of North America (BNA) estimated the total North American population of California gulls at 500,000 - 1,000,000 birds. The breeding population is estimated at 414,000 breeding birds with stable trends (Kushlan et al. 2002, Sauer et al. 2011) (Figure 4.3). In Washington and along the Columbia River corridor, the number of breeding California gulls was 9,052 birds (4,526 pairs) at nine colonies in 1977 (Conover 1979). This number increased to 37,679 birds (18,839 pairs) in 2009 (data collected by RealTimeResearch and by Oregon State University for the USFWS Westwide Colonial Waterbird Survey). The creation of dams in eastern Washington is noted as a cause of population increases over the past 50 years (Seattle Audubon 2005).

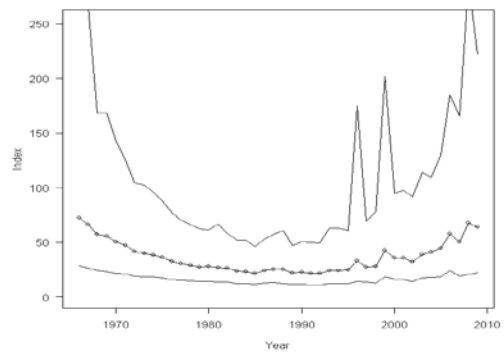

Figure 4.3. California Gull Populations Trend in BBS Western Region 1968-2009 (Sauer et al. 2011).

From FY06 through FY10, WS dispersed an average of 136,680 and killed an average of 1,076 California gulls per year. Based on the yearly average, anticipated projects, and the stable to positive trend in the population (Sauer et al. 2011), WS could possibly remove up to 2,500 California gulls per year and not impact the distribution, abundance, or population trend of the species.

Ring-billed Gull Population Impacts

Ryder (1993) in the BNA estimates the North American population of ring-billed gulls at 3-4 million. This includes breeding and non-breeding birds. The North American breeding population is estimated at 1,700,000 breeders with increasing population trends (Kushlan et al. 2002). More recently, Sauer et al. (2011) show a stable population trend in WA since 2000. In Washington and along the Columbia River corridor, the number of breeding ring-billed gulls was 17,468 birds (8,734 pairs) in 1977 (Conover 1979). This number increased to 30,606 birds (15,303 pairs) in 2009 (data collected by RealTimeResearch and by Oregon State University for the USFWS Westwide Colonial Waterbird Survey). Ring-billed gulls are widely distributed across North America, and populations have increased since the mid-1990s in response to increased human-related food sources.

From FY06 through FY10, WS dispersed an average of 69,074 and killed an average of 922 ring-billed gulls annually. Based on the yearly average, anticipated

projects, and the stable to positive trend in the WA and nation-wide population, WS could possibly remove up to 3,400 ring-billed gulls per year and not impact the distribution, abundance, or population trend of the species.

4.4.1.2.3 Cormorants, Herons, and Mergansers

Double-crested Cormorant Population Impacts

Double-crested cormorant populations throughout the Columbia Basin appear to be increasing, along with concerns about the impact of these birds to salmonid smolt (BRN online). The BBS shows that double-crested cormorant populations in WA have increased during the last several decades (Sauer et al. 2011). WA WS harassed an average of 51,652 double-crested cormorants and killed an average of 202 per year from FY06 through FY10 for projects associated with this EA.

Based on the yearly average, anticipated projects, and the positive trend in the population, WS could possibly remove up to 750 double-crested cormorants per year and not impact the distribution, abundance, or population trend of the species.

Great Blue Heron Population Impacts

Great blue herons in WA are highly adaptable and largely year round residents (Seattle Audubon 2005). Most conflicts with herons occur at fish hatcheries statewide and at airports in the Puget Sound area where they pose a threat to aviation and public safety. Population estimates for the Puget Sound, Strait of Juan de Fuca, and Strait of Georgia include 121 colonies and 4,700 nesting pairs (Eissinger 2007); Sauer et al. (2011) shows the population as relatively stable in Washington. These numbers likely increase as herons migrate into and through the area during the fall and spring migration periods. WS harassed an average of 3,867 and killed an average of 19 herons per year from FY06 through FY10. Harassment occurred primarily at fish hatcheries and hydroelectric facilities, while WS take was restricted to airfields. WA WS could take up to 50 great blue herons per year (about 0.53% of the estimated breeding population of the Puget Sound, because not all birds would be local breeders) and not impact the abundance, distribution, or population trend of the species.

Common Merganser Population Impacts

The estimated average wintering population of mergansers (WDFW groups all mergansers together during their surveys) in WA, from 2006 through 2009, was 7,175 (WDFW 2009). The BBS shows that common merganser populations in WA have increased over the last several decades (Sauer et al. 2011).

WA WS harassed an average of 1,402 common mergansers and killed an average of nine annually, from FY06 through FY10. Based on the yearly average,

anticipated projects, and the positive trend in the population (Sauer et al. 2011), WS could remove up to 200 common mergansers per year, <3% of the wintering population (not all common mergansers are taken during the winter) and not impact the distribution, abundance, or population trend of the species.

4.4.1.2.4 Depredation Order Species

Species listed below are included in depredation orders issued by USFWS for the protection of agriculture, property and public safety. Agencies and the general public are authorized to control depredation by these species on resources without a permit under the guidance provided in CFR §21.43 and §21.46.

Brewer's Blackbird Population Impacts

Partners in Flight estimates that there are 1,700,000 Brewer's blackbirds in WA (RMBO 2004) and the BBS shows that the Brewer's blackbird populations in WA are stable (Sauer et al. 2011). WA WS harassed an average of 14,577 and killed an average of 1,433 Brewer's blackbirds per year. WA WS does not anticipate taking, but could take up to, 10,000 Brewer's blackbirds per year to protect resources, approximately 0.6% of the estimated population, and not impact the abundance, distribution or trend of the species.

Red-winged Blackbird Population Impacts

WA WS dispersed an average of 2,358 and killed an average of 2,346 red-winged blackbirds between FY06 and FY09. BBS shows that the red-winged blackbird population in WA is stable to increasing and Partners in Flight estimates that the statewide population is approximately 1,800,000 (RMBO 2004). WA WS does not anticipate taking, but could take up to 10,000 red-winged blackbirds, 0.5% of the state population, without impacting the abundance, distribution, or trend of the species.

Brown-headed Cowbird Population Impacts

Brown-headed cowbirds are a "brood parasite" that lays eggs in the nests of other species. Cowbird eggs hatch faster than other species and the young develop faster, often killing the host species' young. They are far more abundant and widespread than they were historically, and their parasitic activities can have a detrimental impact on other native birds (Seattle Audubon 2005). Partners in Flight estimates that the WA population of cowbirds is approximately 670,000 (RMBO 2004) and the BBS shows that the brown-headed blackbird population in WA is declining (Sauer et al. 2011). WS harassed an average of 819 and killed an average of 2,010 brown-headed cowbirds per year from FY06 through FY10. WA WS does not anticipate taking but could take up to 10,000 cowbirds annually, approximately 1.5% of the estimated state population, without impacting the abundance, distribution, or trend of the species.

American Crow Population Impacts

The American crow population in WA is estimated to be approximately 380,000 (RMBO 2004), and the BBS trend for WA is relatively stable (Sauer et al. 2011). WA WS harassed an average of 31,688 and killed an average of 1,834 American crows per year for the analysis period. WA WS does not anticipate taking but could take up to 2,000 American crows per year, 0.5% of the estimated state population, without impacting the species abundance, distribution, or trend.

Northwestern Crow Population Impacts

Northwestern crow populations in WA are healthy with an estimated population of 5,000 individuals (RMBO 2004). WA WS dispersed an average of 1,105 and lethally removed and average of 81 northwestern crows per year from FY06 through FY10. BBS trend information indicates that northwestern crow populations have decreased substantially since 1966 in WA, but the Western BBS region population has remained relatively stable since 1966 (Sauer et al. 2011). WS anticipates taking up to 100 Northwestern crows per year, 2% of the population, and would not impact the species abundance, distribution, or trend.

4.4.1.2.5 Passerine Species

Common Raven Population Impacts

Common ravens in WA show an increasing population trend (Sauer et al. 2011). According to Partners in Flight, the breeding population of common ravens in Washington is approximately 21,000. WS dispersed an average of 4,021 and killed an average of 25 ravens per year. WA WS could take up to 250 ravens per year (1% of the estimated breeding WA population) without impacting the species abundance, distribution, or trend.

Northern Flicker Population Impacts

Northern flickers are abundant and widespread throughout their range (Seattle Audubon 2005). Partners in Flight estimates that the WA northern flicker population is approximately 190,000. The BBS trend shows a relatively stable population trend for the species (Sauer et al. 2011). WS killed an average of 45 flickers per year for the protection of property. WA WS could take up to 100 flickers per year and not affect the distribution, abundance, or trend of the species.

House Finch Population Impacts

House finches are common predators of fruit crops in WA and are often associated with starlings in agricultural depredation situations. Partners in Flight estimates that the WA population of house finches is approximately 520,000 (RMBO 2004). The BBS shows an increasing population trend during the last few decades (Sauer et al. 2011). WA WS took an average of 554 house finches for the protection of agriculture. WA WS could take up to 1,300 house finches per year (0.25% of the

estimated WA population) and not impact the abundance, distribution, or trend of the species.

American Robin Population Impacts

WA WS has had little take and few encounters with American robin depredation in recent years; however, WS received increasing complaints from agricultural producers since 2006. WA WS dispersed an average of 127 and lethally removed and average of one American robin per year from FY06 through FY10.

The BBS shows an increasing population trend in American robin populations (Sauer et al. 2011), and Partners in Flights estimates there are 6,200,000 robins in Washington (RMBO 2004). WS could take up to 2,000 robins per year, an estimated 0.03% of the population, without affecting the abundance, distribution, or trend of the species.

Barn and Cliff Swallow Population Impacts

WA WS was requested to assist state and local agencies with swallow management on bridges. This assistance would be in the form of ongoing preventative management to eliminate swallow nesting on bridges where safety, maintenance, or construction projects are planned. In some cases, nests may be constructed and eggs laid prior to WS being able to prevent it. Therefore WS may be required to remove barn or cliff swallow nests/eggs. Partners in Flight estimates there are more than 1 million and 3 million barn and cliff swallows, respectively, in WA (RMBO 2004). WS could remove 500 eggs a year without affecting the abundance, distribution, or trend of these species.

4.4.1.2.6 Raptors

Red-tailed Hawk Population Impacts

The WA red-tailed hawk population is estimated to be 47,000 individuals (RMBO 2004) and BBS trend data for the species shows that WA has an increasing population (Sauer et al. 2011). WA WS harassed an average of 41, relocated an average of 12, and killed an average of 10 red-tailed hawks per year for FY06 through FY10 for the protection of aviation and human safety. WA WS could lethally remove up to 30 red-tailed hawks (0.06% of the estimated statewide population) per year without impacting the abundance, distribution, or trend of the species.

Bald Eagle Population Impacts

On August 9, 2007 the bald eagle was removed from the federal list of T&E species, although it remains protected under the BGEPA and MBTA. The species is a federal Species of Concern and a State Sensitive Species. The increasing population poses a unique threat for airports that contain or border eagle habitat. Eagles are large and generally un-phased by noise once they habituate to an airport environment. Harassment is limited in its effectiveness, increasing the

need to translocate bald eagles to decrease the threat to aviation. Under permits from USFWS, WA WS harassed an average of 37 bald eagles per year may trap and translocate bald eagles from an airfield to protect human health and safety; no eagles were killed by WS during this analysis period. WA WS may translocate as many eagles as necessary and permitted to protect public safety on airfields, while also protecting eagles from being killed by aircraft. Translocation and/or harassment of bald eagles at airfields would not negatively impact the abundance, distribution, or trend of the species.

4.4.1.2.7 Shorebirds

Killdeer Population Impacts

Killdeer (*Charadrius vociferous*) are common year-round in WA (Larsen et al. 2004). The BBS trend for killdeer in WA shows an oscillating, but relatively stable population (Sauer et al. 2011). WA WS harassed an average of 105 and killed an average of 25 killdeer per year for the protection of aviation and human safety. WA WS could take up to 50 killdeer per year without affecting the species' abundance, distribution, or trend.

4.4.1.2.8 Invasive Species

An invasive species is not protected by state or federal regulation and defined under EO 13112 as a species that is non-native (or exotic) to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm, or harm to human health. Invasive species such as the European starling, English sparrow, and feral pigeon commonly occur throughout WA, and other species are located sporadically and in smaller numbers across the state.

Feral Pigeon, English Sparrow, Eurasian Collared-Dove, and European Starling Population Impacts

Feral pigeons, English sparrows, Eurasian collared-doves, and European starlings are listed as predatory birds under WA state law. Other less common introduced, feral, or invasive species in WA include mute swans (*Cygnus olor*) and monk parakeets (*Myiopsitta monachus*). All these species may be trapped or killed year round without a hunting license or when threatening human safety or causing property damage with no limits on take or requirement to report take (WAC 232-12-005, RCW 77.36.030). None of the species listed above are federally protected and the birds, their eggs, and nests may be removed by any legal method.

Feral pigeon BBS trend data for WA indicate that their numbers are increasing (Sauer et al. 2011) with a current estimated population of 800,000 (RMBO 2004). WA WS harassed an average of 7,808 and killed an average of 9,101 feral pigeons per year from FY06 through FY10. As an invasive species, WS could remove as many feral pigeons as necessary to reduce damages to resources, and will conduct

activities as funding allows, but is not proposing any attempt to extirpate the species under this EA.

English sparrows, also called house sparrows, are estimated to number 1,200,000 in WA (RMBO 2004). The BBS trend shows English sparrow populations remain relatively stable with annual variations in populations in WA (Sauer et al. 2011). WA WS dispersed an average of 213 and killed an average of 852 English sparrows per year. As an invasive species, WS could remove as many English sparrows as necessary to reduce damages to resources, and will conduct activities as funding allows, but is not proposing any attempt to extirpate the species under this EA.

Eurasian collared-doves, a native species of south Asia, are a recent arrival in WA and are highly adaptable to agricultural and suburban habitats (Seattle Audubon 2005). The BBS trend shows Eurasian collared-doves populations are exponentially increasing in the Western BBS Region (Sauer et al. 2011). WS is receiving requests for assistance with this species for the protection of agricultural operations, primarily at dairies where the birds are consuming and contaminating feed products. As an invasive species, WS could remove as many Eurasian collared-doves as necessary to alleviate threats to resources, and will conduct activities as funding allows, but is not proposing any attempt to extirpate the species under this EA.

The nationwide European starling population has been estimated to exceed 200 million (National Geographic 2006) and WA has an estimated population of approximately 3,200,000 birds (RMBO 2004). BBS trend data indicate that starling numbers have increased in WA over that last few decades (Sauer et al. 2011). WA WS dispersed an average of 509,481 and killed an average of 425,872 European starlings annually from FY06 through FY10. As an invasive species, WS could remove as many European starlings as necessary to control predation on resources, and will conduct activities as funding allows, but is not proposing any attempt to extirpate the species under this EA.

As non-native, invasive species, and because of their predatory impacts and competition with native birds, these species are considered by many wildlife biologists and ornithologists to be an undesirable component of North American wild and native ecosystems. Any reduction in these species in WA, even to the extent of complete eradication, could be considered beneficial to the human environment.

4.4.1.3 Humaneness of Methods

The issue of humaneness, as it relates to the killing or capturing of wildlife is an important but very complex concept. Kellert and Berry (1980), in a survey of American attitudes toward animals, related that 58% of their respondents,"*...care more about the suffering of individual animals...than they do about species population levels.*" Schmidt (1989) indicated that vertebrate pest control 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 has been 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) 2001). 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) 2004], such as with shooting.

Defining pain as a component of humaneness may be a greater challenge than that of suffering. Altered physiology and behavior can be indicators of pain, and identifying the causes that elicit pain responses in humans would "*...probably are causes for pain in other animals...*" (AVMA 2001). However, pain experienced by individual animals probably ranges from little or no pain to significant pain (CDFG 2004). Some WS damage management methods may thus cause varying degrees of pain in different animal species for varying time frames.

Pain and suffering, as they relate to a review of WS BDM methods to capture animals, have professional and lay points of arbitration. Wildlife managers and the public would be better served to recognize the complexity of defining suffering, since *"...neither medical nor veterinary curricula address suffering or its relief ..."* (CDFG 2004).

Thus, the decision-making process involves tradeoffs between the above aspects of pain and humaneness. An objective analysis of this issue must consider not only the welfare of wild animals but also the welfare of pets or humans, if damage management methods were not used. Therefore, humaneness, in part, appears to be a person's experience with the problem wildlife and their 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 suffering with the constraints imposed by current technology and funding.

BDM methods under this alternative could be viewed by some persons as inhumane. However, the methods used under this alternative comply with WS SOPs, AVMA guidelines, and state and federal regulations which are designed to maximize humaneness and reduce the perceived stress and trauma associated with wildlife management control actions.

WS only uses EPA registered and approved pesticides and WS personnel are experienced, professional and humane in their use of management methods. Under this alternative, target birds would be killed by experienced WS personnel using the best and most appropriate method(s) available. Some people may perceive these methods as inhumane because they oppose all lethal methods of damage management.

WS has improved the selectivity of management devices through research and is striving 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 methods are used in those situations when nonlethal damage management methods are not practical or effective. WA WS personnel are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology, workforce, and funding.

4.4.1.4 Effectiveness of BDM Program in Washington

Effectiveness of the WA BDM program is defined as the timely and successful application of safe and selective methods to prevent and alleviate damage caused by birds. Under the current program, all methods are as selective and effective as possible, in conformance with the WS Decision Model (Slate et al. 1992), WS Directives, and state and federal laws. By using the Decision Model, WS implements the most selective and efficient methods to resolve damage situations. Under Alternative 1, WS would have the fullest array of BDM methods at its professional discretion at all times. In situations where human safety is at risk, immediate and decisive action may be required to prevent injury or death. Alternative 1 would allow the implementation of lethal removal to resolve immediate risks to human health and safety when nonlethal control is inadequate. Should there not be an immediate threat to human health and safety, WS would give preference to nonlethal methods even though lethal removal may become necessary. Therefore, Alternative 1 provides for a highly effective approach to insuring human health and safety and resolving BDM problems.

4.4.2 Alternative 2: Implement All Nonlethal Methods Before Using Lethal Methods

Alternative 2 requires that all nonlethal methods be implemented, regardless of practicality or effectiveness, before any lethal methods are used by WS. With this alternative, WS would be required to implement the entirety of nonlethal methods prior to implementing lethal management. WS does not propose to implement any method that could adversely affect non-target or ESA-listed species, violate state or federal laws, or considered unsafe. Anyone requesting TA would be provided information regarding the use of practical and effective nonlethal and lethal techniques. The WS Decision Model (Slate et al. 1992) could be used under this alternative, however the most effective and practical method(s) may not always be applied under this alternative.

4.4.2.1 Effects of Methods on Non-target and ESA-listed Species

As with Alternative 1, WS would have no effect on non-target or ESA-listed species. However, non-WS individuals may choose to implement control measures themselves, because they do not want damage to continue while waiting for all the nonlethal methods to be exhausted by WS. Use of methods by untrained individuals could negatively affect non-target and ESA-listed species, because untrained persons may apply methods in an unsafe or illegal manner.

4.4.2.2 Effect of Methods on Populations of Target Species

As with Alternative 1, WS would have no adverse effect on target species. However, non-WS individuals may choose to implement control measures themselves,

because they do not want damage to continue while waiting for all the nonlethal methods to be exhausted by WS. Use of methods by untrained individuals could negatively affect some target species because untrained persons may apply methods in an unsafe or illegal manner.

4.4.2.3 Humaneness of Methods

The methods used by WS are equally humane under Alternatives 1 and 2. Individuals requesting immediate assistance with damage situations may not be willing to wait for WS to exhaust the use of nonlethal methods before applying lethal control. This could result in private individuals taking action against actual or perceived damaging species. WS would continue to only recommend and apply the most selective and humane methods possible, but the humaneness of their application by untrained individuals cannot be controlled. This alternative may be less humane than Alternative 1 depending on the application of method(s) by untrained non-WS entities.

4.4.2.4 Effectiveness of BDM Program in Washington

Effectiveness of the WA BDM program is defined as the timely and successful application of safe and selective methods to prevent and alleviate damage caused by birds. Alternative 2 requires that all nonlethal methods be implemented regardless of practicality or effectiveness before any lethal methods are used by WS. This could exacerbate the damage problem by allowing more damage to accrue if the nonlethal methods are ineffective in resolving the problem. In addition, more depredating birds may be attracted to the area or their numbers may increase through reproduction during the time that nonlethal methods are being attempted. This could later result in the necessity to lethally remove more birds than if lethal removal had been implemented according to the WS Decision Model used in Alternative 1. Deferring the use of lethal removal while all other options are exhausted (regardless of effectiveness) could increase the time necessary to resolve the problem and allow an increase in the number of damaging birds, further reducing the overall effectiveness under Alternative 2. Therefore, BDM under Alternative 2 would likely be less effective than the Proposed Alternative.

4.4.3 Alternative 3: Technical Assistance BDM Program Only

Alternative 3 would require WS to provide only TA to resolve bird damage problems.

4.4.3.1 Effects of Methods on Non-target and ESA-listed Species

Under this Alternative, WS would have no direct effect on non-target and ESA-listed species. While WS can analyze its own implementation of BDM methods, the effects of implementation of the same methods by non-WS individuals cannot be fully anticipated or controlled. The inability to fully predict potential effects from a non-WS entity implementing BDM makes Alternative 3 a less responsible choice. The absence of operational BDM by WS may increase the use of illegal or inappropriate methods by individuals when they do not receive WS operational BDM assistance. While WS cannot provide operational BDM under this alternative, requestors could

obtain authorization to use lethal control through USFWS or WDFW. Unintentional harassment and take of non-target and ESA-listed species by non-WS personnel could be greater than or less than those anticipated under Alternative 1 depending on the extent of management and the amount of expertise with which BDM is implemented. Even some nonlethal methods, if applied improperly, can have adverse sub-lethal or lethal effects and be detrimental to sensitive species. The use of lethal methods by non-WS personnel could result in increased take of non-target species, including ESA and state-listed species. The application of BDM methods by untrained personnel would likely result in a greater potential impact to non-target and ESA listed species than the BDM proposed under Alternative 1.

4.4.3.2 Effects of Methods on Populations of Target Species

WS would have no direct effect on target species populations under Alternative 3. The same discussion (section 4.4.2.2) of effects regarding non-target and ESA-listed species applies to target populations.

4.4.3.3 Humaneness of Methods

The methods recommended by WS, if properly applied, are equally humane under Alternatives 1, 2, and 3. WS would continue to only recommend the most selective and humane methods possible, but the humaneness of their application by untrained individuals cannot be controlled. This Alternative may be less humane than Alternative 1 or 2 depending on how the methods are used.

4.4.3.4 Effectiveness of BDM Program in Washington

Effectiveness of the WA BDM program is defined as the timely and successful application of safe and selective methods to prevent and alleviate damage caused by birds. WS would continue to recommend the most selective, effective, and humane methods possible, but the application of these methods by untrained individuals cannot be controlled, and these methods would likely be applied with less expertise than if WS provided operational assistance directly. Therefore, BDM under Alternative 3 would likely be less effective than under the Proposed Alternative.

4.4.4 Alternative 4: No WS Program

Under Alternative 4, WS would not administer or conduct a BDM program in WA. Taking no WS action could reasonably be expected to present be the most risk to humans and target and non-target species, and be the least effective of all of the alternatives examined in this EA. WS would not provide TA or operational BDM.

Some entities are required by law to conduct wildlife damage management. For example, the FAA requires certificated airports to implement measures to alleviate or eliminate wildlife hazards to air carrier operations (14 CFR 139.337(d)). Landfills "demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft" (WAC 173-351-130) and "must prevent or control on-site populations of disease vectors" (WAC 173-351-200. In the absence of WS, the USFWS and WDFW may continue to issue Depredation Permits directly to airports and other

property owners. Airports would still be required to perform wildlife hazard management per FAA guidelines, without any assistance or recommendations from WS. Airports and other entities could contract with non-WS wildlife control sources or conduct BDM on their own without oversight or recommendations from WS.

4.4.4.1 Effect of Methods on Non-target and ESA-listed Species

Under this alternative, WS would not affect non-target and ESA-listed species. WS would offer no TA or operational damage management assistance on practical and effective methods for BDM. It is possible that frustration caused by an inability to reduce damages could lead to the misapplication of methods causing negative effects to non-target and ESA-listed species. The effect of non-WS personnel implementing BDM is unknown, but would likely be more adverse to non-target and ESA listed species than the Proposed Alternative.

4.4.4.2 Effect of Methods on Populations of Target Species

Under this Alternative, WS would not affect target species. WS would offer no TA or operational BDM regarding practical, effective, and safe methods for resolving bird damage. Airports, landfills, and other entities would still be required to perform wildlife hazard management per FAA, WAC, and other state regulations without any assistance or recommendations from WS. Those experiencing bird damage or potential bird damage could contract with non-WS wildlife control sources or conduct BDM on their own, without oversight or recommendations from WS. It is possible that frustration caused by an inability of individuals to reduce losses could lead to the misapplication of methods. The effect of non-WS personnel implementing BDM is unknown, but would likely be more adverse to target species than the Proposed Alternative.

4.4.4.3 Humaneness of Methods

Under this Alternative, WS could not recommend or provide practical, effective, and safe methods for reducing bird damage and threats to human health and safety. As such, WS could not affect application of methods or the humaneness of methods use. The humaneness of methods applied by untrained individuals would be unknown. Frustrated resource owners could implement methods not usually recommended by WS, use BDM methods incorrectly, or attempt illegal methods. As such, this Alternative would likely be less humane than Alternative 1.

4.4.4.4 Effectiveness of BDM Program in Washington

Under the No WS Program Alternative, WS would not be available to provide Agency expertise in resolving bird damage problems, either TA or operational assistance. Those needing assistance would likely turn to other wildlife agencies, private pest control operators, or attempt to resolve problems themselves. While some may find effective help and advice, others may not. As such, this Alternative would likely be less effective in resolving bird damage problems than Alternative 1.

4.5 Cumulative Impacts

Cumulative impacts, as defined by CEQ (40 CFR 1508.7), are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts may result from individually minor, but collectively significant, actions taking place over time. WS accounts for the majority of migratory bird take under depredation permits issued by the USFWS. The primary purpose of this EA was to combine WS BDM activities into one EA and analyze take comprehensively under one EA.

Because WS is the primary organization in WA reducing bird damage and taking migratory birds while conducting those activities, it follows that other USFWS permitted take would be less. WS obtained USFWS depredation report information for all non-WS permitted take of migratory birds from the USFWS from 2006 through 2010. USFWS records data on a calendar year basis, whereas WS records data on a FY basis. WS compared the average annual non-WS take against the average WS annual take for the reporting period (Table 4.1). Non-WS take is lower and does not result in any significant impacts to the human environment when combined with WS take.

Table 4.1 Comparison of WS average annual take to that of all other USFWS permitted take in WA.

Species	Ave Non-WS Take/Year	Ave WS Take/Year
gulls, glaucous-winged	154	3,749
gulls, california	49	1,076
gulls, ring-billed	73	922
finches, house	0	554
cormorants, double-crested	4	202
ducks, mallard	90	122
gulls, herring	3	68
flicker, northern	4	45
killdeer	6	25
ravens, common	1	25
geese, canada	171	23
gulls, western	15	20
herons, great blue	5	19
ducks, teal, green-winged	11	18
ducks, gadwall	11	17
ducks, teal, blue-winged	3	12
ducks, bufflehead	4	11
ducks, ring-necked	6	11
ducks, wigeon, american	1	11
ducks, northern shoveler	3	10
hawks, red-tailed	14	10

As analyzed in this EA, WS BDM activities and the methods used or recommended by WA WS will have no cumulative adverse effects on target, non-target, or ESA-listed wildlife species.

4.6 Summary

No significant cumulative environmental impacts are expected from the Proposed Alternative in this EA (Table 4.2). Under the Proposed Alternative, the lethal removal of birds by WS would not have a significant impact on overall bird populations in WA, USFWS Region 1, or in the BBS Western Region, but some very localized reductions of some species may occur. WS maintains ongoing contact with USFWS and WDFW to ensure local, state, and regional knowledge of WS activities and wildlife population trends.

Table 4.2. Summary of Environmental Consequences for each issue and alternative analyzed compared to the Proposed Alternative (Alternative 1).				
Issues	Alternative 1 (Current Program)	Alternative 2 (Exhaust Non-lethal)	Alternative 3 (TA Only)	Alternative 4 (No WS Program)
Effects of Methods on Non-Target and ESA-Listed Species	Low	Low to Moderate	Low to High	Low to High
Effects of Methods on Target Species	Low	Low	Low to High	Low to High
Humaneness of Methods	High	High	Moderate	Low to Moderate
Effectiveness of Methods	High	Low	Low	Low

No risk to public safety is expected when WS' services are provided to requesting individuals under Alternative 1, because only trained and experienced wildlife biologists/specialists would conduct and/or recommend BDM activities. There is an increased risk to public safety when persons reject WS assistance and recommendations, conduct their own BDM (Alternatives 2 and 3), or when no WS operational BDM is provided (Alternatives 3 and 4). Although some persons will likely be opposed to WS' participation in BDM activities on public and private lands in WA, the analysis in this EA indicates that an adaptive integrated BDM program would not result in significant cumulative adverse impacts on the quality of the human environment.

This EA will be reviewed periodically to assure conformance with current environmental regulations and project scope. Substantial changes in the project scope or changes in environmental regulations may require revisions and supplementation, or a new EA.

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Appendix A Additional Tables and Figures

Table A.1. WS BDM Operations by species and FY, by lethal versus nonlethal.

	FY06		FY07		FY08		FY09		FY10	
Row Labels	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**
Cormorants										
PELAGIC	6	27	0	0	1	5	8	349	2	3
DOUBLE-CRESTED	143	42,105	258	25,932	163	74,168	255	64,980	193	51,077
Depredation Order Birds										
STARLINGS, EUROPEAN	432,986	687,731	233,988	637,425	711,322	307,952	429,366	387,342	321,699	526,954
MAGPIES, BLACK-BILLED	0	0	1	0	2	0	21	0	24	0
CROWS, NORTHWESTERN	44	1,359	46	2,585	124	703	95	482	98	398
CROWS, AMERICAN	724	33,143	1,137	18,507	1,595	33,256	2,964	41,596	2,748	31,936
COWBIRDS, BROWN-HEADED	270	200	376	2,037	2,505	60	2,859	1,250	4,042	550
BLACKBIRDS, Z-(MIXED SPECIES)	25	3,900	0	0	0	0	0	0	0	0
BLACKBIRDS, YELLOW-HEADED	13	1	2	0	0	0	1	0	0	1
BLACKBIRDS, RED-WINGED	995	0	551	5,446	2,254	1,430	3,852	1,703	4,076	3,213
BLACKBIRDS, BREWER`S	1,896	2,709	1,435	20,245	1,189	14,080	963	18,748	1,680	17,105
Domestic Feral										
SPARROWS, HOUSE/ENGLISH	1,677	144	402	616	1,896	248	173	30	110	25
PIGEONS, FERAL (ROCK)	10,716	12,486	7,136	16,020	7,448	4,855	6,724	6,041	7,014	6,105
PARAKEETS, MONK	0	0	0	0	4	7	0	0	0	0
GEESE, FERAL	5	0	0	0	0	0	2	0	0	0
DUCKS, FERAL	46	0	3	1	7	0	0	0	4	0
Ducks										
WOOD	0	0	1	0	0	0	0	0	1	19
WIGEON, AMERICAN	3	676	10	1,984	23	433	2	87	15	114
TEAL, GREEN-WINGED	2	141	19	335	46	659	9	282	15	296
TEAL, CINNAMON	0	0	1	8	8	2	0	0	1	14
TEAL, BLUE-WINGED	0	0	9	4	14	2	0	0	38	46
SCAUP, LESSER	0	7	0	0	0	0	0	0	0	0
RING-NECKED	3	179	8	353	27	995	2	186	14	356
NORTHERN SHOVELER	0	9	1	7	36	265	1	3	11	44
NORTHERN PINTAIL	0	0	0	2	0	5	1	46	1	0
MALLARDS	25	1,413	109	2,126	162	1,631	139	1,293	176	1,876
GOLDENEYE, COMMON	0	6,674	0	55	2	734	0	719	0	8

	FY06		FY07		FY08		FY09		FY10	
Row Labels	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**
Ducks										
GOLDENEYE, BARROW`S	0	1	0	0	0	20	0	0	0	0
GADWALL	14	738	18	394	34	652	11	327	10	260
CANVASBACK	0	1	0	0	0	0	0	0	0	0
BUFFLEHEAD	12	8,147	11	7,578	12	11,882	6	9,857	14	1,461
COOTS, AMERICAN	0	26	0	11	0	22	0	21	0	0
Flickers										
NORTHERN	3	3	8	5	56	1	59	4	100	4
Geese										
WHITE-FRONTED, GREATER	0	0	0	0	0	0	5	975	0	0
SNOW, GREATER	0	0	0	0	1	0	0	0	0	0
CANADA	20	1,811	21	4,827	35	5,882	20	7,290	1,421	16,461
Grebes										
WESTERN	0	1	0	0	0	0	0	0	0	641
PIED-BILLED	0	2	0	0	0	0	0	0	0	0
HORNED	0	0	0	1	0	0	0	0	0	0
(OTHER)	0	6	0	0	0	0	0	0	0	0
Gulls										
WESTERN	38	509	4	1	2	1	46	5,361	12	131
RING-BILLED	773	55,018	779	96,865	1,278	98,395	748	45,971	1,034	49,120
MEW	0	0	0	0	4	741	0	0	2	15
HERRING	56	30,037	43	10,533	34	8,829	159	2,158	50	1,347
GLAUCOUS-WINGED	3,931	557,378	3,287	92,983	5,032	213,437	3,874	812,664	2,517	253,368
GLAUCOUS	0	2	0	0	0	0	0	0	0	4
CALIFORNIA	566	135,272	1,323	54,213	1,307	126,822	829	188,829	1,355	178,265
BONAPARTE`S	0	3	0	0	0	0	0	0	0	0
Cranes and Herons										
CRANES, SANDHILL	0	0	0	0	0	0	0	0	0	250
HERONS, GREEN	0	1	0	0	0	23	0	0	0	3
HERONS, GREAT BLUE	0	3,725	33	3,445	30	5,919	16	3,455	17	2,792
Kingfisher										
BELTED	0	0	0	70	0	37	0	0	0	0
(ALL)	1	1,776	0	0	0	0	0	0	0	0

	FY06		FY07		FY08		FY09		FY10	
Row Labels	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**
Mergansers										
HOODED	1	1,029	3	876	3	3,315	0	4,029	1	638
COMMON	6	633	3	1,340	16	4,326	12	434	8	278
Passerines										
WAXWINGS, CEDAR	0	0	0	1	0	0	0	0	0	0
ROBINS, AMERICAN	0	0	0	29	2	100	1	440	0	75
OTHER SONG BIRDS	0	6	0	0	0	0	0	0	0	0
MEADOWLARKS, WESTERN	0	0	0	14	0	0	0	0	0	0
FINCHES, PURPLE	1	0	0	0	0	0	0	0	0	3
FINCHES, HOUSE	530	0	1,265	34	953	52	24	0	0	0
DOVES, MOURNING	0	0	0	0	3	1	1	0	0	0
Pelicans										
AMERICAN WHITE	0	0	0	0	0	0	0	462	0	19
Raptors										
VULTURES, TURKEY	0	0	0	0	12	38	2	7	3	19
SHRIKES (ALL)	0	0	0	0	0	1	0	0	0	0
OWLS, SHORT-EARED	0	0	0	0	8	7	0	0	0	0
OWLS, GREAT HORNED	0	0	0	0	0	0	0	10	0	2
OWLS, COMMON BARN	0	1	0	0	0	4	0	7	0	0
OSPREYS	0	1	0	0	0	1	0	0	0	0
HAWKS, ROUGH-LEGGED	0	0	0	0	9	23	14	32	0	15
HAWKS, RED-TAILED	0	4	0	19	30	78	13	89	5	78
HAWKS, HARRIER, NORTHERN	0	1	0	0	20	27	11	7	15	47
HAWKS, COOPER`S	0	12	0	2	0	4	0	3	0	2
FALCONS, MERLIN	0	0	0	0	0	0	0	0	0	1
FALCONS, AMERICAN KESTREL	0	6	6	12	1	6	3	7	3	8
EAGLES, BALD	0	0	0	0	0	29	0	93	0	65
Ravens										
RAVENS, COMMON	83	11,538	3	379	5	87	10	3,091	24	5,012
Shorebirds										
TURNSTONES, RUDDY	0	0	0	0	0	300	0	1,550	0	0
SNIPES, COMMON	0	0	0	0	0	0	0	0	1	4
PLOVERS, BLACK-BELLIED	0	0	5	195	9	78	2	67	8	412
KILLDEERS	13	138	68	98	16	85	5	18	24	186

	FY06		FY07		FY08		FY09		FY10	
Row Labels	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**	**Lethal**	**Nonlethal**
Shorebirds (cont.)										
DUNLINS	0	0	0	0	5	100	0	0	0	200
Swallows										
VIOLET-GREEN	0	0	0	0	0	100	0	0	0	0
BARN	0	0	18	50	0	0	0	100	15	5
Swans										
TUNDRA	0	0	0	0	0	0	0	0	5	397
MUTE	0	0	0	0	0	5	0	0	0	0
Terns										
FORSTER`S	0	135	0	97	0	3,090	0	575	0	0
CASPIAN	0	5,488	0	3,433	0	35,284	0	8,023	0	9,103
Upland										
TURKEYS, WILD	0	0	0	0	0	0	0	0	4	0
QUAIL (ALL)	0	0	0	1	0	0	0	1	0	0
PHEASANTS, RING-NECKED	0	0	0	0	1	0	0	0	0	0

Appendix B Authorities and Compliance

Wildlife Services. WS' activities are conducted at the request of and in cooperation with other federal, state, and local agencies, private organizations, and individuals. WS is directed by the U.S. Congress to protect American agriculture, property, natural resources and human health and safety from damage associated with wildlife (Act of March 2, 1931, as amended (46 Stat. 1486; 7 United States Code (USC). 426-426c). "Wildlife damage management" is defined as, *the reduction or alleviation of damage or other problems caused by, or related to, the presence of wildlife,* and it is an integral component of wildlife management (Leopold 1933, Conover 2002).

United States Fish and Wildlife Service. The USFWS is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife resources and their habitats. The USFWS mission is to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. Responsibilities are shared with other federal, state, tribal, and local entities; however, the USFWS has specific responsibilities for endangered species, migratory birds, inter-jurisdictional fish, and certain marine mammals, as well as for lands and waters they administer for the management and protection of these resources.

The USFWS regulates the taking of migratory birds under the four bilateral migratory bird treaties the United States entered into with Great Britain (for Canada), Mexico, Japan, and Russia. Regulations allowing the take of migratory birds are authorized by the MBTA (16 U.S.C. Sec's. 703 - 711), and the Fish and Wildlife Improvement Act of 1978 (16 U.S.C. Sec. 712). The Acts authorize and direct the Secretary of the Interior to allow hunting, taking, and killing of migratory birds subject to the provisions of, and in order to carry out the purposes of, the four migratory bird treaties.

Federal Aviation Administration. The FAA's authority for managing wildlife hazards at airports is based on 14 CFR, Part 139.337. The FAA is the federal agency responsible for developing and enforcing air transportation safety regulations and is authorized to reduce wildlife hazards at commercial and non-commercial airports. Many of these regulations are codified in the Federal Aviation Regulations (FARs). The FAA is responsible for setting and enforcing the FARs and policies to enhance public safety. For commercial airports, 14CFR, Part 139.337 (Wildlife Hazard Management) directs the airport sponsor to conduct a wildlife hazard assessment if an air carrier aircraft experiences multiple wildlife strikes or an air carrier aircraft experiences substantial damage from striking wildlife. At non-commercial airports, the FAA also expects that the airport be aware of wildlife hazards in and around their airport and take corrective action if warranted; the FAA uses Advisory Circular 150/5200-33B to guide their decision making process.

The FAA is empowered to issue airport operation certificates to airports serving air carriers, and to establish minimum safety standards for the operation of airports. Some of these regulations and polices directly involved the management of wildlife and wildlife hazards on and/or near airports. Under FAR 139.337, Wildlife Hazard Management, an airport is required to conduct a Wildlife Hazard Assessment and a Wildlife Hazard Management Plan when specific wildlife event(s) occur. Under the FAA/WS MOU, the WS program supports all of the requirements contained in FAR 139.337. FAA CertAlert No. 97-02 further clarifies the roles of, and relationships between, the FAA and WS with regards to wildlife hazards on or near airports.

Washington Department of Fish and Wildlife. WDFW's authority for managing wildlife in the state of Washington is based on Title 77 of the Revised Code of Washington (RCW).

Washington State Department of Transportation (WSDOT). WSDOT is a department within the government of WA responsible for the steward of a large and robust transportation system, and for ensuring that people and goods move safely and efficiently. In addition to building, maintaining, and operating the state highway system, WSDOT is responsible for the state ferry system, and works in partnership with others to maintain and improve local roads, railroads, airports, and multi-modal alternatives to driving.

Compliance with Federal Laws, Executive Orders and Regulations

National Environmental Policy Act. All federal actions are subject to NEPA (Public Law 91-190, 42 U.S.C. 4321 et seq.). WS and the USFWS follow CEQ regulations implementing NEPA (40 CFR 1500 et seq.), USDA (7 CFR 1b), and WS follows the APHIS Implementing Guidelines (7 CFR 372) as a part of the decision-making process. These laws, regulations, and guidelines generally outline five broad types of activities to be accomplished as part of any project: public involvement, analysis, documentation, implementation, and monitoring. NEPA also sets forth the requirement that all major federal actions be evaluated in terms of their potential to significantly affect the quality of the human environment for the purpose of avoiding or, where possible, mitigating and minimizing adverse impacts. Federal activities affecting the physical and biological environment are regulated in part by CEQ through regulations in 40 CFR, Parts 1500-1508. In accordance with CEQ and USDA regulations, APHIS Guidelines Concerning Implementation of NEPA Procedures, as published in the Federal Register (44 CFR 50381-50384) provide guidance to APHIS regarding the NEPA process.

Pursuant to NEPA and CEQ regulations, this EA documents the analysis of a proposed program, informs decision-makers and the public of reasonable alternatives capable of avoiding or minimizing adverse impacts, and serves as a decision-aiding mechanism to ensure that the policies and goals of NEPA are infused into federal agency actions. This EA was prepared by integrating as many of the natural and social sciences as warranted, based on the potential effects of the proposed action. The direct, indirect, and cumulative impacts of the proposed action are analyzed.

Endangered Species Act. Under the ESA, all federal agencies are charged with a responsibility to conserve endangered and threatened species and to utilize their authorities in furtherance of the purposes of the ESA (Sec.2(c)). WS conducts Section 7 consultations with the USFWS to utilize 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 . . .*" (Sec.7 (a) (2)). WS conducts formal Section 7 Consultations with the USFWS at the national level (USDI 1992) and consultations with the USFWS at the local level as appropriate.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-711; 40 Stat. 755), as amended. The MBTA provides the USFWS regulatory authority to protect species of birds that migrate outside the United States. The law prohibits any "*take*" of these species by private entities, except as permitted by the USFWS; therefore the USFWS issues permits to private entities for reducing bird damage (50 CFR 21.41). 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 TA or operational assistance. In severe cases of bird damage, WS provides recommendations to the USFWS for the issuance of depredation permits to private entities. Starlings, pigeons, house sparrows and domestic waterfowl are not classified as protected migratory birds and therefore have no protection under the MBTA. USFWS depredation permits are also not required for "yellow-headed, red-winged, and Brewer's blackbirds, cowbirds, all grackles, crows (except Mexican crows), and magpies found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when

concentrated in such numbers and manner as to constitute a health hazard or other nuisance" (50 CFR 21.43).

Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. §§ 668-668d, June 8, 1940, as amended 1959, 1962, 1972, and 1978). The BGEPA prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Transport includes convey or carry by any means; also deliver or receive for conveyance. If compatible with the preservation of bald and golden eagles, the Secretary of the Interior may issue regulations authorizing the taking, possession and transportation of these eagles for scientific or exhibition purposes, for religious purposes of Indian tribes or for the protection of wildlife, agricultural or other interests. Bald eagles may not be taken for any purpose unless the Secretary issues a permit prior to the taking.

National Historical Preservation Act (NHPA) of 1966 as amended. The NHPA and its implementing regulations (CFR 36, 800) require federal agencies to initiate the section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under section 106. Each of the bird damage management methods described in this EA that might be used operationally by WS does not cause major ground disturbance, does not cause any physical destruction or damage to property, does not cause any alterations of property, wildlife habitat, or landscapes, and does not involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the proposed action are not generally the types of activities that would have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under an alternative selected as a result of a decision on this EA, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

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

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

Occupational Safety and Health Act of 1970. The OSHA of 1970 and its supplementing regulations (29CFR1910) on sanitation standards state 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.

Environmental Justice and Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Environmental Justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status. 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. A critical goal of Executive Order 12898 is to improve the scientific basis for decision-making by conducting assessments that identify and prioritize environmental health risks and procedures for risk reduction. Environmental Justice is a priority within USDA, APHIS, and WS. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA and other federal laws and regulations.

WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to ensure Environmental Justice. WS personnel use BDM methods as selectively and environmentally conscientiously as possible. WS assistance is provided on a request basis in cooperation with State and local governments and without discrimination against people who are of low income or in minority populations. The nature of WS's BDM activities are such that they do not have much, if any, potential to result in disproportionate environmental effects on minority or low-income populations. Therefore, no such adverse or disproportionate environmental impacts to such persons or populations are expected.

Executive Order 13045 - Protection of Children from Environmental Health and Safety Risks. Children may suffer disproportionately from environmental health and safety risks, including their developmental physical and mental status, for many reasons. Because WS makes it a high priority to identify and assess environmental health and safety risks, WS has considered the impacts that alternatives analyzed in this EA might have on children. All WS BDM is conducted using only legally available and approved damage management methods where it is highly unlikely that children would be adversely affected at all, let alone in any disproportionate way. Based on the Risk Assessment (USDA 1997, Appendix P) concluded that when WS program methods are used following normally accepted safety practices and WS standard operating procedures, such use has negligible impacts on the environment or on human health and safety, which includes the health and safety of children.

Executive Order 13112 - Invasive Species. Authorized by former President Clinton, Executive Order (EO) 13112 establishes guidance to federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The EO, in part, states that each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law: 1) reduce invasion of exotic species and the associated damages, 2) monitor invasive species populations and provide for restoration of native species and habitats, 3) conduct research on invasive species and develop technologies to prevent introduction, and 4) provide for environmentally sound control and promote public education on invasive species.

The EO also established an Invasive Species Council whose members include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the U.S. Environmental Protection Agency. The Council shall be Co-Chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council oversees: 1) the implementation of this order, 2) that federal agency activities concerning invasive species are coordinated, complementary, cost-efficient, and effective, 3) the development of recommendations for international cooperation in addressing invasive species, 4) the development, in consultation with the CEQ, of guiding principles for federal agencies, 5) the development of a coordinated network among federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health, 6) the establishment of a coordinated, up-to-date information-sharing system and 7) preparation and issuance of a national Invasive Species Management Plan.

Executive Order 13186 and MOU between USFWS and WS. EO 13186 directs federal agencies to protect migratory birds and strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and minimize the take of migratory birds through enhanced collaboration between WS and the USFWS, in coordination with state, tribal, and local governments. A national-level MOU between the USFWS and WS has been drafted to facilitate the implementation of EO 13186.

Appendix C Bird Damage Management Methods

NonLethal Methods

Nonlethal methods can be integrated with lethal methods to increase the efficacy of a management program. Birds may acclimate to some nonlethal methods if they are applied for too lengthy a time period or incorrectly. On rare occasions, a bird may die from some nonlethal methods listed here. Many factors, including weight, stomach contents, or physiology may make individual birds more or less susceptible to certain nonlethal management methods. Therefore, conditions unknown to WS or beyond the control of WS may be responsible for some mortality during implementation of nonlethal damage management techniques.

Habitat Modification is the practice of altering the habitat in an area to make it less attractive to wildlife in general or it can target a specific species of wildlife. Wildlife presence is directly related to the availability and quality of habitat, so habitat can be managed to reduce or eliminate use of an area by some wildlife. Habitat management is appropriate when the potential for damage can be reduced without increasing a resource owner's costs beyond an acceptable level or diminishing their ability to manage resources. When wildlife is damaging property, removing or altering the source of the attraction is the ultimate goal, but may take time to achieve. Seasonal changes may warrant variations in habitat modification plans to be effective.

Translocation of damaging birds to other areas following live capture generally is not cost-effective, as those species causing damage are usually common and numerous throughout WA. Translocation of damaging species may cause similar problems at a new location, but often involves stress to the translocated animal which may result in poor survival rates. Translocated individuals may also leave the area they are released and return to former sites.

However, there may be situations where bird translocation is the preferred method. That decision may be based on available funding, species involved, personnel availability and probability of success. Translocation of damaging birds might be a viable solution and acceptable to the public when the birds are considered to have high value, such as T&E species. In these cases, WS consults with the USFWS and WDFW to coordinate capture, transportation, and selection of suitable relocation sites.

Nest destruction is the removal of nesting materials during the construction phase of the nesting cycle. Permits are not required to remove the nest of most birds if eggs or chicks are not present in the nest. Nest destruction is usually feasible only when dealing with a limited number of birds or nest sites. This method is used to discourage birds from constructing nests in areas, which may create nuisances or safety concerns for home and business owners. Nest destruction poses no imminent danger to pets or the public.

Exclusion devices, such as overhead wire grids, conventional netting and fencing can be effective but are often cost-prohibitive, particularly because of the mobility of birds. Exclusion that is adequate to stop bird movements can also restrict movements of livestock, people, and other wildlife (Fuller-Perrine and Tobin 1993). Some birds may be excluded from ledges, hand railings, ponds or other areas using overhead wires/lines (Fairaizl 1992, Lowney 1993). Wire/lines should be made visible to the birds by hanging streamers or other objects at intervals along the wires. The objective is to discourage bird loafing or feeding activities and not cause injury or death. The application of wire arrays and designs at dams are continually adapted and updated to meet changing needs based on dam structure, spill patterns, bird foraging activity, etc.

Overhead wire networks generally require little maintenance other than ensuring proper wire tension and replacing broken wires, though the expense of maintenance may be burdensome. Overhead wires have been demonstrated to be most effective on sites less than 2 acres, but may be considered unsightly or aesthetically unappealing to some people. In addition, wire grids can render a pond unusable for boating, swimming, fishing, and other recreational activities. Installation costs are about $1,000 per surface acre for materials. Heavy plastic strips hung vertically in open doorways have been successful in some situations for excluding birds (Johnson and Glahn 1994).

Porcupine wire (or similar materials) can be placed on ledges to prevent birds from perching or nesting on the ledges. This material can be expensive and debris often collects in the projections making it ineffective and unsightly.

Visual scaring techniques, such as Mylar tape, (highly reflective surface produces flashes of light that startles birds), eye-spot balloons (the large eyes supposedly give a visual cue that a large predator is present), flags, lasers and effigies (scarecrows), are occasionally 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). 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 relatively new technique used to frighten and disperse birds from their roosts or loafing area. Studies have shown that several bird species, such as double-crested cormorants, Canada geese, other waterfowl, gulls, vultures, and American crows exhibited avoidance of laser beams during field trails (Glahn et al. 2001, Blackwell et al. 2002). The lower power levels, directionality, accuracy over distance, and silence of laser devices make them safe and effective species-specific alternatives to pyrotechnics, shotguns, and other traditionally available dispersal tools (APHIS 2003). Best results are achieved under low-light conditions (*i.e.,* from sunset through sunrise) by targeting structures or trees proximal to roosting birds where the beam is projected. In field situations, habituation to lasers has not been observed (APHIS 2003).

The avian eye generally filters most damaging (*e.g*., short-wavelength) radiation from the sun. In tests conducted with double-crested cormorants exposed to a relatively low-power Class-III B laser at a distance of 1 meter, no ocular damage was noted (APHIS 2003). However, unlike the eye of birds, the human eye, with the exception of the blink reflex, is essentially unprotected from thermal damage to retinal tissue associated with concentrated laser radiation. The Class II, battery-powered, 68-mW, 650-nm, diode Avian Dissuader is used by WS in WA. Because of the risk of eye damage, safety guidelines and specifications have been developed and are strictly followed by the user (OSHA 1991, Glahn and Blackwell 2000).

Auditory frightening devices such as sirens, horns, propane exploders, pyrotechnics, harassment shooting, electronic guards, and bioacoustics use sounds to scare birds. Harassment of avian predators is accomplished from the shoreline, dam structures, and boats to provide thorough coverage. If harassment is not effective, shooting could be used to reinforce nonlethal methods; shooting is not used to manage or reduce populations. Nonlethal harassment comprised more than 98% of WS BDM activities at dams.

Auditory frightening devices are often not practical in suburban, urban, or rural areas if they disturb people, livestock, or pets. Birds may quickly habituate to frightening devices if not reinforced with other techniques (Bomford and O'Brien 1990).

Paintball guns are an effective tool that can be used to disperse and move birds from an area. Paintballs are not fired directly at the birds with the intention to hit them, but in the direction of the bird. The firing of a paintball gun produces a gunshot-like report that will often frighten birds. In addition to an auditory stimulus, there is also a visual and auditory stimulus from the paintball hitting and breaking near the bird. The combination of stimuli increases the efficacy of a frightening device.

Other harassment methods include the incorporation of a human physical presence or presence of a vehicle. Physical harassment in the form of human voice, waving arms, and clapping of hands will often work in many situations when other frightening devices are not applicable. In addition, vehicle harassment is also often effective in scaring birds from an area. Vehicle harassment involves simply driving towards or near a bird causing it to leave the area.

Hand-capture is an effective way to capture juvenile birds or birds that are unable to fly due to injury or molting of flight feathers.

Drive nets are used to catch molting (flightless) waterfowl. Long netting forms a funnel to a holding pen. Birds will often flock together on land or water and can be carefully herded into the holding pen.

Clover, funnel, cage, and decoy traps are enclosure traps made of netting, hardware cloth, or other light fencing material and come in many different sizes and designs, depending on the species of birds being captured. The entrances of the traps also varies greatly from swinging-door, one-way door, or funnel entrance. Traps are baited with grain or other food material to attract target birds. Decoy traps maintain live birds in the trap with sufficient food, water, and shelter to assure their survival. Feeding behavior and calls of the decoy birds attract other birds, which enter and become trapped themselves. WS' standard procedure when conducting trapping operations is to ensure that an adequate supply of food and water is in the trap to sustain captured birds for several days. Active traps are checked daily, every other day, or as appropriate, to replenish bait and water and to remove captured birds. Cage/live traps, as applied and used by WS, pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Nest box traps are used to capture local breeding and post-breeding starlings and other targeted cavity nesting birds (DeHaven and Guarino 1969, Knittle and Guarino 1976).

Remote activated nets can be used to capture ground-nesting birds or birds at baits. The nets may have frames of various sizes and shapes or may be frameless, depending on the number of individuals and species targeted. The nets are fired by a remote controlled release trigger. Triggering the device may either release a frame to close over an area or a net may be propelled over a target flock.

Mist nets are more commonly used for capturing small birds such as passerines or shorebirds, but can be used to capture larger birds such as waterfowl. 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. Mist nets can be use over land or water. Mist nets are monitored to ensure non-targets caught are released quickly and reported appropriately.

Cannon nets/rocket nets are normally used for birds such as feral pigeons, gulls, and waterfowl and use mortar projectiles to propel a net 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 of other capture devices.

Net guns are effective for capturing individual birds in situations where the use of other capture devices is not feasible. A net gun is a heavily modified firearm that uses a blank cartridge to propel a net over a target. Nets with different sizes of mesh are available to capture birds of different sizes. Weights attached to the corners of the net are placed in four barrels on the gun, while the net is carefully placed in a container between the barrels. When fired, gasses from the cartridge drive the weights out of the barrels and carry the net over the target.

Pole traps are generally set for raptors which perch on poles while hunting for food. Hawks and owls can be safely trapped using a small padded-jaw leg-hold trap, snare, or tangle snares set on the top of poles. Poles that are 5 to 10 feet high are erected where they can be easily seen, and a trap is placed on top of the pole. A wire is run through the trap ring and secured to the base of the pole so that trapped birds may slide to the ground where they can rest. Pole traps are monitored regularly to quickly remove captured birds.

Bal-chatri traps are small traps used for capturing birds of prey such as hawks and falcons. Live bait (*e.g.*, pigeon, starling, a rodent) is used to lure raptors into landing on the trap. The trap is made of chicken wire or other wire mesh material and formed into a Quonset hut-shaped cage which holds the live bait and is anchored securely to the ground. The outside top and sides are covered with many nooses consisting of strong monofilament line or stiff nylon string that entangle the raptor's feet and hold the bird.

Swedish goshawk traps are a type of large cage-trap. Like the Bal-chatri, they use live bait (*e.g.*, pigeons, starlings, rodents) to lure a raptor into the trap. The live bait is secured in an additional cage inside the trap so the raptor cannot harm the animals used as bait. While attempting to get the bait, the raptor releases a trigger that closes the doors of the trap, securing the bird inside the large cage.

Leghold/Foothold traps (padded jaw) are a common and effective way to catch animals. The trap consists of 2 steel jaws, at least one spring, a pan, and dog (trigger), and come in numerous sizes to catch different sizes of animals. When the animal steps on the pan, the jaws are released and the spring(s) close the jaws around the foot, securely holding the animal. The jaws of the trap may be laminated, offset, or padded to reduce pressure on the animal's leg/foot.

Methyl Anthranilate is a food flavoring (artificial grape flavoring) that is approved by the Food and Drug Administration as an additive to both human and livestock feeds (Timm 1994). It is a naturally occurring chemical and is the characteristic odor/flavor of Concord grapes. Methyl anthranilate is a taste repellent to birds, causing them to avoid using or feeding in areas where it has been applied. Methyl anthranilate is not fundamentally toxic to mammals or birds and at room temperature it is an oily yellowish liquid.

Anthraquinone is registered as a repellent to protect turf from goose damage. Research continues and application may become available in the future. Like methyl anthranilate, anthraquinone has low toxicity to birds and mammals. Avian species consuming anthraquinone for the first time typically exhibit no immediate aversion but are subsequently repelled due to a suspected post-ingestional response.

Alpha-chloralose is a central nervous system depressant used as an immobilizing agent to capture and remove nuisance water fowl and other birds. It is typically delivered as a well contained bait in small quantities with minimal hazards to pets, and humans; single bread or corn baits fed directly to the target birds. WA personnel are present at the site of the application during baiting to retrieve the immobilized birds. Unconsumed baits are removed from the site following each treatment.

Lethal Methods

Egg removal/Egg Addling/Oiling/Destruction may take place when nest destruction is used to discourage birds from nesting in areas that require protection and is a method of suppressing reproduction of local nuisance bird populations by destroying eggs and embryos prior to hatching. Eggs that are collected during nest/egg removal activities may be donated to charitable organizations or disposed of in a landfill. The removal of nests and eggs often discourages birds from nesting in an area, causing them to abandon the site. Egg addling is conducted by vigorously shaking an egg causing detachment of the embryo from the egg sac. Egg destruction can also be accomplished in several other ways, but the most commonly used methods are manually gathering eggs, or by oiling or spraying the eggs with a liquid which covers the entire egg and prevents the embryo from obtaining oxygen.

Shooting is a very selective method used to remove birds and reinforce nonlethal methods. Shooting is more effective as a dispersal technique than as a way to reduce bird densities when a large number of birds are present. Shooting with shotguns, air rifles, and rifles may be used to reduce bird damage problems when lethal methods are determined to be appropriate. All employees who use firearms receive firearms safety and handling training in compliance with WS Directives 2.615 and WS Firearm Safety Training Manual.

To ensure safe use and awareness, WS employees who use firearms to conduct official duties are required to attend approved firearms safety training and receive refresher course every 2 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment*, which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Hunting and Depredation Permits. WS will sometimes recommend that resource owners consider legal hunting as an option for reducing damage caused by species of game birds. Although legal hunting is impractical and/or prohibited in many urban/suburban areas, it can be used to reduce the use of a resource by local populations of game birds in the appropriate areas. Legal hunting also reinforces harassment programs (Kadlec 1968). WS may recommend that resource owners receive DPs from the USFWS to legally take bird species that are protected under the MBTA. In these situations, WS will investigate the complaint and provide this information to the USFWS either recommending or advising against the permit application by submitting a Form 37.

Snap traps can be effective in removing offending birds. The trap is affixed to the building with the trigger pointed downward in the vicinity of the damage. The trap is baited with nuts (walnuts, almonds, or pecans) or suet. If multiple areas are being damaged, several traps can be used.

Snares are a simple and effective method to capture animals. Snares made of cable or other line can be used to catch target animals. A snare can be place in a tunnel or other small opening used by an offending animal (*e.g.*, pigeon). When an animal walks through the loop in the snare, a lock slides down the cable and constricts around the animal, holding it in place. A stop can be placed on the snare to stop the constriction of the snare and to avoid euthanizing the animal if desired.

Avitrol® is rarely used by WS (zero to five applications annually) as a management tool for problem birds. Avitrol® treated bait is placed in areas where the targeted birds are feeding. Birds that consume treated baits normally die (Johnson and Glahn 1994). Birds display abnormal flying behavior after ingesting treated baits and emit distress vocalization (pigeons do not). Avitrol® is a restricted use pesticide that can only be sold to certified applicators and is available in several bait formulations where only a small portion of the individual grains carry the chemical.

Avitrol® is not selective for targeted birds and exposure to non-target species is possible. It is highly toxic to birds and mammals, though blackbirds and corvids may be slightly more sensitive to the chemical than other species. In addition, chronic toxicity has not been demonstrated (Schafer 1991). Laboratory studies with predator and scavenger species have shown minimal potential for secondary poisoning. However, in a field study, magpies and crows may have been affected secondarily (Schafer 1991). American kestrels (*Falco sparverius*) that fed on blackbirds for 7 to 45 days which had died from a lethal dose of Avitrol® were not adversely affected (Schafer 1991). Therefore, no probable secondary risk is expected with use of this compound.

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 3 to 22 months. Avitrol® is non-accumulative in tissues and is rapidly metabolized by many species (Schafer 1991).

DRC-1339 is the principal chemical method that would be used for starling and pigeon damage management under the proposed action. For more than 30 years, DRC-1339 has proven to be an effective method of starling, blackbird, and pigeon control at feedlots, dairies, airports, and in urban areas (West et al. 1967, Besser et al. 1967, Decino et al. 1966). Studies documented the effectiveness of DRC-1339 in resolving starling 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 pigeon 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 non-sensitive birds, predatory birds, and mammals. For example, starlings, a highly sensitive species, require a dose of only 0.3mg/bird to cause death (Royall et al. 1967). Most bird species that are responsible for damage, including starlings, blackbirds, pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other species such as raptors, sparrows, and eagles are classified as non-sensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and T&E species (USDA 1995). 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 blackbirds and starlings killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost non-existent. 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 soils 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 1995). Appendix P of USDA (1995) 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 the use of DRC-1339.

Sodium Lauryl Sulfate (SLS) is a wetting agent used to disperse and lethally control starling, blackbirds, and cowbirds where they roost (USDA 2008). SLS is a surfactant commonly used in soap products. When applied, SLS allows water to penetrate and saturate feathers so, in conjunction with low temperatures (<41° F) and sufficient water, birds die of hypothermia. In studies, birds died as soon as 30 minutes after exposure to SLS.

SLS was exempted from FIFRA regulations by the EPA, but states retain the right to accept the EPA's regulatory exemption or require further State registration. Application methods should be in compliance with FIFRA 25(b) exemption requirements.

Euthanasia Methods

Cervical dislocation may be used to euthanize birds which are captured in live traps. The AVMA approves this technique as a humane method of euthanasia and states that cervical dislocation, when properly executed, is a humane technique for euthanasia of poultry and other small birds (AVMA 2007). Cervical dislocation rapidly induces unconsciousness, does not chemically contaminate the tissue, and is rapidly accomplished (AVMA 2007).

Carbon dioxide (CO_2) is a colorless, odorless gas approved by the AVMA as a euthanasia agent (AVMA 2007) and used by WS in cases where live caught animals need to be euthanized. . The advantages of using CO_2 are: 1) its well established rapid depressant, analgesic, and anesthetic effects, 2) its ready availability (*e.g.*, can be purchased in compressed gas cylinders), 3) its broad safety margin (*e.g.*, poses minimal hazard to personnel when used with properly designed equipment), and 4) its negligible bioaccumulation potential. Inhalation of CO_2 causes little distress to the birds, suppresses nervous activity, and induces death within 5 minutes. In addition, inhalation of CO_2 at a concentration of 7.5% increases the pain threshold, and higher concentrations of CO_2 have a rapid anesthetic effect (AVMA 2007).

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