Portland International Airport
Wildlife Hazard Management Plan

2009 Update

PORT OF PORTLAND

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Airport Certification Manual Reference

The Port of Portland completed an Ecological Study (now referred to as a Wildlife Hazard Assessment by the Federal Aviation Administration) and a Wildlife Hazard Management Plan (WHMP) for Portland International Airport (PDX) in 2003 to comply with 14 CFR Part 139.337. The 2003 WHMP was subsequently updated in 2004 and again in 2009 to reflect revised FAA regulations, incorporate the findings of the Port's wildlife risk assessment process, account for changes to the WHMP initiated in 2004, and to complete minor editorial corrections. These documents have been reviewed and approved by the Administrator and his/her representative. These documents are located in the office of the General Manager of Operations and Maintenance, and are hereby incorporated by reference into the PDX Airport Certification Manual (ACM). The WHMP will be reviewed on a periodic basis to determine the effectiveness of the program. Appropriate changes will be made as the need arises. This review will take place annually.

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ACRONYMS

AC – FAA Advisory Circular

ACM – Airport Certification Manual

AF1 – Airfield 1

AFI – Air Force Instruction

AFPAM – Air Force Pamphlet

AGL – Above Ground Level

AIRMAN – Airport Information Report Manager

ATC – Air Traffic Control

ATIS – Automatic Terminal Information Service

AOA – Air Operations Area

AOS – Airport Operations Supervisor

BATS – Business Analysis and Term Sheet Procedures

BASH – Bird Aircraft Strike Hazard

CFR – Code of Federal Regulation

CUMP – Conditional Use Master Plan

CWA – Clean Water Act

DEQ – Oregon Department of Environmental Quality

EA – Environmental Assessment

EC – Environmental Conservation Zone

EMS – Environmental management system

EP – Environmental Protection Zone

EPA – U.S. Environmental Protection Agency

EIS – Environmental Impact Statement

FAA – Federal Aviation Administration

FAR – Federal Aviation Regulations

FOD – Foreign Object or Debris

FONSI – Finding of No Significant Impact

IAW – Air Force Instruction

MBTA – Migratory Bird Treaty Act

MCDD – Multnomah County Drainage District

MOC – Maintenance Operations Center

NEPA – National Environmental Policy Act

NOAA – National Oceanic Atmospheric Administration

NRI – Natural Resources Inventory

OAR – Oregon Administrative Rules

ODFW – Oregon Department of Fish and Wildlife

ODSL – Oregon Division of State Lands

OI – Operating Instruction

ORANG – Oregon Air National Guard

ORS – Oregon Revised Statues

PDX – Portland International Airport

PIA – Portland International Airport (ORANG reference to PDX)

PIC – Portland International Center

Port – Portland of Portland

RPZ – Runway Protection Zone

TSA – Transportation Security Administration

USACE – US Army Corps of Engineers

USAF – U.S. Air Force

USDI – U.S. Department of the Interior

USFWS – U.S. Fish and Wildlife Service

WHMP – Wildlife Hazard Management Plan

ANNUAL REVIEW AND REPORTING

14 CFR Part 139.337 requires an annual review of the airport's Wildlife Hazard Management Plan (WHMP), and revision as necessary. In accordance with this mandate and because the program at PDX is one of delegated authority under the Airport Certification Manual (ACM), the PDX WHMP will be reviewed jointly by the Airside Operations Manager and the Wildlife Manager on an annual basis. This review will take place in the spring of the year so as to pre-date the annual airport Part 139 certification inspection that occurs in summer. The annual WHMP review will be documented, and filed with an annual accomplishment report with the Federal Aviation Administration (FAA). This will provide the FAA certification officer with the status of current programs, a summary of the year's accomplishments, and a list of issues and concerns that can be addressed at the annual certification inspection. Management Actions and Tracking Table, Appendix F in the WHMP will be updated annually for FAA submittal, serving as the basis for annual review and reporting. The intent is to develop accountability and program continuity over time, and provide the certification inspector with information in a timely manner that will contribute to a productive and mutually beneficial dialog in support of the annual inspection process.

In addition to the annual review process, the PDX WHMP will be reviewed whenever an air carrier aircraft experiences a multiple wildlife strike, a damaging collision with wildlife or an engine ingestion of wildlife. The WHMP will be revised as necessary, when either the program or the hazards and issues at the airport change significantly, or every 5 years. The intent is to maintain the WHMP as an adaptive program level plan that will continue to grow to effectively meet the requirements of wildlife hazard management at PDX. The PDX WHMP provides both strategic program guidance and the operational component required by 14 CFR Part 139 that provides the basis for annual work planning, budget development, and accomplishment reporting.

ANNUAL REVIEW LOG

To be signed at the completion of the annual Part 139 inspection, thereby authorizing delegation of authority for the PDX WHMP for the upcoming year under the Airport Certification Manual.

Aviation Wildlife Manager	Date	Airside Operations Manager	Date	FAA Inspector	Date

EXECUTIVE SUMMARY

PORTLAND INTERNATIONAL AIRPORT WILDLIFE HAZARD MANAGEMENT PLAN 2009 UPDATE

1.0 INTRODUCTION

The first Wildlife Hazard Management Plan (WHMP) for Portland International Airport (PDX) was prepared in 1998 to address wildlife hazards identified on and around PDX. It was revised in 2003 to address significant changes in program organization, administration and implementation that had occurred over the prior 5 years. The 2009 Update to the WHMP addresses revised FAA regulations, incorporates the findings of the Port's wildlife risk assessment process, accounts for changes to the WHMP initiated in 2004, and includes minor editorial corrections from the 2003 version. The 2009 Update supersedes the 2004 installment of the WHMP upon its authorization. It is an operational safety plan that is implemented by the Port of Portland (Port) for PDX.

1.1 PURPOSE AND APPLICATION

The WHMP fulfills the requirements of a Federal Aviation Administration (FAA) mandate in accordance with the provisions of 14 CFR 139.337. A Wildlife Hazard Assessment (WHA) is required by the FAA when any of the following 4 triggering events occurs on or near the airport:

(1) An air carrier aircraft experiences multiple wildlife strikes;
(2) An air carrier aircraft experiences substantial damage from striking wildlife;
(3) An air carrier aircraft experiences an engine ingestion of wildlife; or
(4) Wildlife of a size, or in numbers, capable of causing an event is observed to have access to any airport flight pattern or aircraft movement area.

The need for a WHMP at an airport is determined by a FAA Certification Administrator after reviewing the WHA. Based on these issues, the FAA Administrator required the Port in 1996 to develop a WHMP for PDX. The acceptance of the 1998, 2003, and 2004 PDX WHMPs by the FAA satisfied this requirement.

The overall objective of the WHMP is to develop an integrated and adaptive program to effectively manage risk at PDX by reducing the probability of occurrence of wildlife/aircraft collisions. While terrestrial wildlife are a concern at PDX, the wildlife deterrent fencing installed around the airfield perimeter in 1997 has minimized the incursion of terrestrial wildlife onto the airfield to a manageable level. Bird strikes are statistically a much higher risk for aircraft at PDX, especially during the critical phases of departure and landing operations. Consequently, the risk evaluation process of the WHMP focuses on avian wildlife. It is recognized that the risk of a bird strike at PDX can never be completely eliminated, given the eco-regional location of the airport on both the Pacific flyway and at the confluence of two major river systems, all of which serve as

major movement corridors for both migratory and resident species of birds. However the underlying premise of the Wildlife Hazard Management program is that it is possible to manage the risk to an acceptable level, and it is the intent of the WHMP to provide the necessary direction to do so, in a scientifically sound manner, utilizing non-lethal means wherever possible.

1.1.2 LOCAL PERSPECTIVE (Airport Description)

PDX, owned and operated by the Port, is the 34th busiest airport in the country based on passenger enplanements. PDX serves a population of 3.5 million people in northwest Oregon and southwest Washington. It offers scheduled passenger and cargo service via 15 airlines to 45 domestic cities and 3 international destinations. In addition PDX is home to the 142nd Fighter Wing of the Oregon Air National Guard.

PDX is located four miles northeast of downtown Portland, Oregon on approximately 3,229 acres of Port-owned land. It is situated on the south shore of the Columbia River, and is bounded on the south by the Columbia Slough that runs parallel to the Columbia River. A tributary to the Columbia Slough, Peninsula Slough, lies immediately west of PDX. The airfield itself comprises approximately 1,735 acres and consists of two primary parallel runways and one cross wind runway, associated taxiways, roadways and buildings including hangars, the terminal building, the Air Traffic Control tower, etc. An 8-foot high security fence surrounds the entire perimeter of the airfield.

Bordered on 3 sides by open water features, located on a major migratory flyway and at the confluence of 2 major river systems, PDX is located in a region rich in avian wildlife. Metropolitan areas to the north on the Washington state side of the Columbia River and to the south on the Oregon side of the river have surrounded the airfield with urban development. This has effectively reduced the number and extent of large contiguous areas of natural habitat available for wildlife use on both sides of the Columbia River. Due to this reduction in open space there is an increase in wildlife use of the remaining relatively undeveloped areas, including the PDX airfield and vicinity.

1.3 WHMP ADMINISTRATION

The 2004 WHMP serves as the foundation for the ongoing development of the wildlife program at PDX. As such it not only incorporates strategic guidance and establishes baseline documentation for the program, but it must also demonstrate compliance with the operational requirements of the FAA as stated in 14 CFR Part 139.337. This section of the plan provides a statutory overview of the FAA requirements, and establishes a guide, or roadmap, that identifies where in the WHMP each specific requirement is fulfilled.

In addition, the WHMP is subject to a mandatory annual review process. It is envisioned that the program will incorporate this requirement into an annual accomplishment report that will be submitted to the FAA sufficiently in advance of the annual airport certification inspection to inform and guide that process. The WHMP will be revised as necessary, when either program changes or management issues arise, or every 5 years, whichever comes first. This review/revision protocol will ensure that the WHMP stays current and

responsive to changing conditions, and incorporates the principles of adaptive management.

2.0 APPLICABLE LAWS, REGULATIONS AND POLICIES

Along with the regulatory requirements of the FAA, it was determined that the operational nature of the WHMP meets the criteria for a federal action and requires the appropriate level of environmental assessment in accordance with the National Environmental Policy Act (NEPA). Accordingly, an NEPA Environmental Assessment was developed on a parallel track to assess the environmental impacts of implementing the management strategies developed in the WHMP. This assessment was completed during the 2004 calendar year. An informal programmatic Endangered Species Act consultation process was also initiated prior to implementation.

In addition to those regulations specified above, Chapter 2 identifies the other major federal, state and local mandates that define the legal context of compliance within which the WHMP must operate. Along with the external mandates, the WHMP must demonstrate how it fits within and supports the stated missions of the Port and the Aviation Division, and how Port and Aviation policies guide it. While the priority of the Wildlife Hazard Management program at PDX is aviation safety, the Port will achieve this goal through responsible environmental stewardship. This reflects both the overarching mission of the Port and also the values of the regional community.

3.0 PROGRAM ORGANIZATION, ROLES AND RESPONSIBILITIES

In response to concerns about the increasing number of wildlife strikes at PDX and two significant bird strikes in 2000 and 2001, PDX hosted a site visit in December of 2001 by a panel of internationally recognized experts in the fields of aviation and aviation/wildlife issues. Following a weeklong review of the issues and program capabilities at PDX, the panel submitted a detailed report summarizing their recommendations for improvement. These recommendations provided the impetus to expand the awareness of these issues, which gained management support for implementing change. The program reorganization described in this revision of the WHMP reflects the suggestions of the panel plus the lessons learned as the program evolves.

The single overriding factor that was identified by the panel was the need to increase the level of dedicated resources and staff. The ability to provide dedicated dawn to dusk hazing and harassment capability on the airfield to clear the airspace for a specific aircraft operation was identified as an essential need. Once the staffing and programming concerns were met for this direct operational need, the next critical need that was identified by the panel was the development of an effective habitat management program that could begin addressing the reasons why certain species of concern are attracted to the airfield environment in the first place. To best address this concern and provide the technical, biological, and ecological expertise necessary, the wildlife hazard management function was transferred from Airfield Operations to Aviation Environment & Safety and located under the Natural Resources Program, effective March of 2002.

In the course of chartering the new WHMP, formal and informal presentations were held with all internal stakeholders to identify program level points of intersection where either the wildlife program would affect another Port function, or vice versa. These are presented in this chapter as recommended points of program interaction, requiring more definition and employing a collaborative approach to incorporate wildlife deterrent concepts and designs in early phases of projects. This will prevent new hazardous wildlife attractants from being created, or expensive retrofitting of existing structures from being necessary. As these are refined by actual practice, it is envisioned that some of them will be incorporated more formally as roles and responsibilities in future Environmental Management System (EMS) Procedures.

As an operational safety plan for PDX, the WHMP is not universally preemptive or prescriptive. Aviation Environmental & Safety does not have the autonomy nor would it be possible to control all aspects and factors that may affect wildlife hazard issues on or around the airfield. While decision making for routine, everyday wildlife operational issues has to reside at the Natural Resource Manager's or the Aviation Wildlife Manager's levels, the ultimate decision maker for Aviation is the Director of Aviation. Wildlife hazard issues and management recommendations are but one of many factors that influence the business decisions that the Director of Aviation must make to ensure accomplishment of the Aviation Mission.

4.0 Implementation Strategies

To develop management strategies that effectively reduce the bird strike risk at PDX, it is first necessary to assess and evaluate the risk to aircraft safety from potential wildlife hazards. A formal risk evaluation protocol was developed that accomplishes the following:

1). Formalize and document the risk evaluation process with a systematic, consistent methodology.

2). Define levels of "acceptable and unacceptable risk."

3). Provide a process that results in defensible, risk management decisions.

4). Prioritize management actions to reduce risk, thereby, facilitating efficient resource allocation.

The formal risk evaluation approach developed by the Port is based on the body of work of Dr. J. R. Allan, adapted to the site-specific issues and FAA requirements at PDX. This risk-based approach is the primary assessment methodology for wildlife hazard management in the future. All management scenarios presented in this document are to be validated by the risk evaluation process, as it is refined in each update. It is expected that this iterative process will evolve over time as new information and real world application provide direction. The risk evaluation model is included as Appendix A.

Implementation of the WHMP is based upon management strategies developed to address the wildlife hazards unique to each of the 12 management areas identified at PDX. These strategies are organized according to four management components or

"pillars" that support the Wildlife Hazard Management program: (1) short-term operational strategies, (2) research and development projects, (3) long-term management strategies, and (4) information and educational programs. These program components are interconnected by lateral paths representing information and technology transfer.

The first pillar, short-term operational strategies, deals with the need of the moment. This includes the reactive, dedicated dawn-to-dusk hazing and harassment program intended to clear the airspace of wildlife species of concern for an immediate aircraft operation. In addition, short-term habitat manipulations on a relatively small scale are included in this operational category. Examples include tree topping and pruning, netting projects, rodent baiting, mowing schedules, and perching deterrents.

PDX has set a management objectives to achieve this first pillar, when possible, in a non-lethal manner, utilizing the full range of technologies available. However, implicit in this statement is the recognition that it may not always be possible to avoid lethal control. The 2009 WHMP identifies the decision-making process necessary for lethal action (See Section 5.1.7), which is based on the level of threat to public safety. A basic premise of the lethal action strategy is that it will target an individual animal and its problematic behavior, rather than targeting a population. The only current exceptions to this rule are the European starling control program, and the prey base control strategies for the grey-tailed vole. The European starling is an introduced pest that not only presents a significant hazard to aviation (due primarily to its flocking behavior), but also represents an ecological risk as they threaten native species diversity. Grey-tailed voles are found in abundance in the artificially created and maintained short grass environment of the airfield, and are the primary food source for red-tailed hawks and other predatory species of concern at PDX such as great blue herons, barn owls and great horned owls. Based on actual strike records and other factors such as soaring/hunting behavior and size of bird, the red-tailed hawk is currently the number one wildlife species of concern at PDX. Short of actual site conversion of the grass cover of the airfield, the development of an effective prey base control strategy is essential in order to reduce the attractiveness of the airfield to red-tailed hawks.

The second pillar is ongoing applied research and development to expand the range of available wildlife control options, to test new hypotheses and to evaluate new technologies. It is important to the Port that the results of its applied research efforts be discussed and shared with the larger, professional community. Wildlife hazard management deals with the behavior of dynamic, living organisms that have a demonstrated capability to adapt to the human environment. This requires a level of program flexibility and a commitment to the principles of adaptive management for the program in order to be effective over time. The information gained from research and development projects transfers into both the short-term operational strategies and the long-term management strategies.

The third program pillar is the development of long-term management strategies, including habitat modification and permanent site conversion. These strategies are based on the premise that both the physical presence of wildlife species of concern on the airfield, and the length of time that they are present can be diminished by reducing the attractiveness of the habitat on and around the airport. However, in highly modified

environments like airports, single-focused habitat alterations to discourage one species of concern often can create enhanced conditions for another species of concern. Therefore, effective long-term habitat modifications must be designed to consider changes to the whole ecological system. Long-term management strategies may range from physically excluding the species permanently from the area (where possible), to habitat modifications, like tree or wetland removal.

The fourth pillar of the program is the information and education component, which recognizes that wildlife issues are of widespread interest to both internal and external groups and individuals. The success of the program is predicated on active cooperation with a large number of stakeholders, and an ongoing program to inform and elevate awareness of wildlife issues at PDX. Providing outreach opportunities also provides input that helps to tie PDX issues into its larger regional context.

5.0 RISK MANAGEMENT TECHNIQUES

The risk management techniques and protocols outlined in Chapter 5 define the full range of operational tactics and management strategies designed to increase public safety by reducing the incidence of wildlife-aircraft collisions at PDX. Together these represent the toolbox of acceptable techniques available to the Wildlife staff, and run the full range of actions from day-to-day operational tactics to long-term habitat modification strategies. Because the 2009 WHMP serves as the foundation for program development, operational protocols that are responsive to legal, jurisdictional and safety constraints are included.

Wildlife control procedures are direct actions taken to discourage, disperse and remove wildlife species of concern from the airfield and vicinity. Their implementation includes the day-to-day operational efforts of the Wildlife staff to ensure that the approach and departure airspace is as free of potential wildlife hazards as is practicable. Wildlife control actions are generally reactive to the situation of the moment and are responsive to any perceived threats to aircraft safety that may be posed by wildlife species of concern. While the management objective is to accomplish this with non-lethal means whenever possible, protocols are established defining the decision-making process and implementation requirements for direct lethal control should the need arise.

Habitat modification and other long term management strategies attempt to address the reasons why certain species of wildlife are attracted to the airfield environment, bringing them into conflict with aircraft operations. These include the physical manipulation or complete removal of features or characteristics (both natural and constructed) that are attractive to wildlife species of concern and are spatially located such that they draw these species into or across the critical flight paths. The design and installation of structures intended to exclude wildlife species of concern from the airfield or from specific features on the airfield are included in this section.

Given that wildlife hazard management is not an exact science, and that species of wildlife respond differently to changing circumstances including sustained management actions, it is critical that an ongoing research and development program be integrated with the principles of adaptive management to provide the flexibility necessary to maintain an effective program over time. The results of ongoing testing and monitoring

are applied directly to the development of operational tactics and management strategies.

Wildlife issues and management strategies at PDX are of interest to a great many people, both internal to the Port and in the public arena. The need for an ongoing public information and education component is recognized as essential to the success of the Wildlife Hazard Management program at PDX. In addition to public information and education, there is a need to continue to share and foster the exchange of technical information with other Port functional areas, as well as the larger regional and national aviation and wildlife communities.

6.0 WILDLIFE STAFF TRAINING REQUIREMENTS

Chapter 6.0 presents training requirements that have been identified collaboratively with the Airfield Operations Department, the FAA Air Traffic Control tower, Port Police, and Wildlife staff. As new training needs are identified it is expected that this chapter will expand to meet those needs.

7.0 LITERATURE CITED

Chapter 7.0 presents the literature citations referenced in the text of the WHMP.

APPENDICES

The Appendices contain pertinent supporting documentation to the WHMP.

1 INTRODUCTION

1.1. Purpose and Application

The Federal Aviation Administration (FAA) recognizes the potential hazards that certain species of wildlife may pose, under certain circumstances, to aircraft operations at airports regulated by the FAA. The FAA generally requires airports where air carrier aircraft experience multiple wildlife strikes, damaging collisions with wildlife, engine ingestion of wildlife, or wildlife of a size or in numbers capable of causing such events, to develop and implement a Wildlife Hazard Management Plan (WHMP) according to 14 CFR Part 139.337. The Port of Portland's (Port) Portland International Airport (PDX) meets these criteria and therefore, the Port has developed and maintains this WHMP that delineates the responsibilities, policies, procedures and regulations necessary to reduce identified wildlife hazards on or around PDX.

1.1.1. National Perspective

Nationwide, wildlife can present a variety of problems that affect operations at airports. Between 1990 and 2007, 82,057 wildlife strikes involving civil aircraft were reported to the FAA (Cleary et al. 2008). Strike reporting is currently voluntary and the FAA has identified that wildlife strikes throughout the nation are under-reported. There has been a major effort in recent years to educate airport and airline personnel on the importance of reporting strikes. This along with an increase in aircraft operations and increases in populations of hazardous wildlife species likely combine to cause a dramatic increase in the number of strikes reported annually. Wildlife strikes have caused catastrophic accidents that involved the loss of human lives. Although the potential for this type of accident is low, the concern is, nonetheless, very real. Cleary et al. (2008) documents 197 human injuries and 11 fatalities nationwide resulting from wildlife strikes between 1990 and 2007.

Wildlife strikes have other impacts at airports and on the traveling public. Fourteen percent of aircraft-bird strikes and sixty one percent of aircraft-mammal strikes reported from 1990 to 2007 resulted in damage to aircraft or some other related cost (Cleary et al. 2008). The FAA reports that at a minimum, wildlife-aircraft strikes cost the USA civil aviation industry 118,712 hours /year of aircraft down time, $95 million/year in direct monetary losses, and $31 million/year in associated costs (Cleary et al. 2008).

1.1.2. Local Perspective

PDX, owned and operated by the Port of Portland, is the 34th busiest airport in the country when ranked by passenger enplanements. PDX serves a population of 3.5 million people in northwest Oregon and southwest Washington. It offers scheduled nonstop passenger service via 14 airlines to 42 domestic cities and 5 international

destinations. The airport averaged 260 daily scheduled commercial aircraft during the busiest travel season and assisted 14,299,234 passengers in 2008. PDX is also well served by 11 air cargo carriers. Military operations at PDX include the 142nd Fighter Wing of the Oregon Air National Guard (ORANG). Operations (landing and departures) by commercial, general aviation and military entities totaled 252,572 in 2008.

PDX is located approximately six miles northeast of downtown Portland on approximately 3,290 acres of Port-owned land (Figure 1). It is situated adjacent to the Columbia River within the historic Columbia River floodplain. The Columbia Slough lies immediately south of the airport; water levels in the Slough are maintained by a system of pumps and levees. A tributary to the Columbia Slough, Peninsula Slough, lies immediately west of PDX. Land uses surrounding PDX include agriculture, light industrial development, commercial development, residential, recreational uses (e.g., boating, golf courses) and undeveloped open space (much of which is managed for airport safety), among others.

The approximately 1,735-acre PDX airfield includes flat, managed (mowed) grasslands, asphalt/concrete runways, taxiways, roadways, and buildings associated with the airport terminal and other airport and airline operations (Figure 2). The managed grasslands provide foraging habitat for raptors, herons and geese, and shelter to prey species such as voles and shrews. An 8-foot high security fence surrounds the entire airfield. Three runways lie within the airfield:

- Runway 10L/28R is 8,000 feet long and 150 feet wide (scheduled for extension in 2009 to 9,800 feet);
- Runway 10R/28L is 11,000 feet long and 150 feet wide; and
- Runway 3/21 is 7,000 feet long and 150 feet wide (scheduled for reduction in 2009 to 6,800 feet).

Runways 10L/28R and 10R/28L are oriented northwest by southeast, parallel to one another and roughly parallel to the nearby Columbia River and Columbia Slough and prevailing seasonal winds. Runway 3/21 is oriented northeast by southwest, roughly perpendicular to the Columbia River and the Columbia Slough.

A large variety of wildlife live in the vicinity of PDX, and many more birds pass through the area during their seasonal migrations along the Pacific Flyway. As urban density in the surrounding area has increased, the airport and adjacent golf courses (open spaces) have experienced increased use as resident and migratory wildlife seek out the remaining expanses of relatively undeveloped open space. In a typical month, Port monitoring data indicate that about 60 different species of birds and nine mammal species are observed in the vicinity of the airport. Many of these species pose a potential hazard to the safe operation of aircraft whenever they enter the approach/departure path of aircraft.

Wildlife strikes at PDX reflect the unique environment in which the facility is located. The geographical location of PDX within the historic Columbia River floodplain and within the Pacific Flyway for migratory birds predisposes the airfield to a significant wildlife

presence that includes both resident and seasonal populations. Between January 1998 and December 2008, 752 bird strikes and 4 coyote strikes were reported at PDX. These strikes did not result in any human injuries; however significant aircraft damage did occur in a few instances. Additionally, wildlife on an airfield are known to cause property damage and destruction to airport facilities (e.g., chewed electric cables powering runway lights). While these are not direct hazards to the safe operation of aircraft, they are recognized as part of the larger airport management program.

1.1.3. WHMP Objective and Principles

The ultimate objective of the WHMP is to provide a safe airfield environment for aircraft at, or in the immediate vicinity of PDX by reducing wildlife hazards. To accomplish this objective, the implementation of the Wildlife Hazard Management program is intended to reduce the probability of occurrence of a wildlife/aircraft collision.

Basic principles used by the Port in the implementation of the WHMP include:

- Frequent inspections of airport facilities are necessary to ensure that potential hazards are recognized and sufficient wildlife control measures are in place;
- Any response to a wildlife threat is handled using the widest range of options available to the Port, and will be supported by a risk evaluation process the Port has developed (Appendix A);
- Attempts to alleviate wildlife threats to public safety through recognized non-lethal means are the primary focus of the Port's program;
- Lethal means are recognized as an additional option when the threat to public safety is imminent and non-lethal means have failed to address the issue.

The Port's Aviation Environmental and Safety Department is responsible for the implementation of this program, under delegation of authority from the Operations Department, in accordance with the PDX Airport Certification Manual and 14 CFR Part 139. The services and cooperation of city, state and/or federal agencies, as well as other Port departments, is essential to ensure the program's effectiveness.

1.2. Wildlife Hazard Assessment [14 CFR 139.337]

In support of the 2004 WHMP, Jones & Stokes (2003) prepared a baseline Ecological Study[1] (now referred to as a Wildlife Hazard Assessment by the FAA) for PDX. In this study, baseline information on wildlife and wildlife habitats at PDX were summarized and evaluated in relation to potential aviation safety concerns to fulfill the requirements of 14

[1] Included as an appendix to the 2004 WHMP

CFR Part 139.337. Building on this baseline study, PDX wildlife staff continue to collect data on wildlife presence and behavior on and around the airfield. The data is documented in the Airport Information Report Manager, AIRMAN database and is utilized to annually reassess and validate current wildlife hazards at PDX. AIRMAN provides a database where wildlife data is compiled and organized for easy management queries. This dataset represents a significant compilation of wildlife data specific to PDX from 2003 to present (see section 5.1.3 for more detail on AIRMAN).

1.2.1. Wildlife Strikes

Wildlife strike records at various airports have shown that birds and mammals can pose a threat to public aviation safety either by being present on the airfield during aircraft landings and departures or directly in the flight path of aircraft (Cleary and Dolbeer 2000). Strikes occur when: wildlife physically collide with aircraft, birds or other wildlife remains are found within 200 feet of centerline of a runway, unless another reason for the animal's death is identified or the animal's presence on the airport had a significant negative effect on a flight (e.g., aborted takeoff or landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal). Wildlife strikes are almost always fatal to the animal, can cause costly damages and delays, and potential loss of human life.

Nationally, approximately 56% of all bird-aircraft strikes occur below 100 feet above ground level (AGL), and 78% occur below 1,000 feet AGL (Cleary et al. 2003). At airports, this low altitude generally corresponds with aircraft that are in either the departure or landing phase of flight. The FAA requires the maintenance of a clear, safe airspace for aircraft landings and departures. The runway protection zone (RPZ), a profile of the approach and transition area located at the end of each runway, represents the area in which aircraft are most vulnerable to wildlife strike hazards. Risk to aircraft is greatest during takeoff when aircraft are likely to be at their maximum payload and thrust, and have limited maneuverability.

As stated above, between 1997 and 2008 752 bird strikes and 4 coyote strikes were reported at PDX. Raptors (44%) were the most frequently struck group of birds, followed by passerines (31%), shorebirds (18%) and waterfowl (6%). Red-tailed hawks (14%) and American Kestrels (14%) were the species most frequently struck during this period. Reported bird strikes have fluctuated over the last 10 years but there has been an overall increase in the numbers reported over the last 3 years. This recent increase is a consequence of many factors, the most significant being an increase in strike reporting due to a higher level of training and awareness of both airline tenants and PDX staff.

1.2.2. Wildlife Species of Concern

A number of factors interact to determine the frequency with which a particular species of wildlife may be struck by aircraft (Allan 2000). Included among these are:

- Population abundance on and around the airfield (may vary diurnally and/or seasonally);

- Habitat use patterns on and around the airfield (local habitat preferences for feeding, breeding and resting);
- Distribution of suitable habitat patches and movement patterns in relation to the airfield;
- Airport facilities and operations that may act as attractants (e.g., structures, landscaping, stormwater facilities, infield mowing) or deterrents (e.g., hazing, habitat modifications);
- Behavioral patterns that may bring wildlife into the approach/departure path of aircraft (e.g., birds that soar or tower, seasonal migrations);
- Ability to detect and/or avoid aircraft (e.g., juveniles vs. adults, resident wildlife vs. transient wildlife); and
- Frequency of air traffic and air traffic patterns at the airport.

Whether wildlife at risk of being struck by aircraft pose a hazard to aircraft depends upon the size and number of individuals involved. For example, it is well established that bird strikes involving larger birds or flocks of smaller birds are more likely to result in damage to aircraft than single small birds (Allan 2000). The current certification standards for turbine engine (60 inch and 100 inch size) testing are as follows: an engine must be able to withstand the ingestion of 16 small birds (3 oz. each); 8 medium birds (1.5 lbs each); or 1 large bird (4 lbs) (Eschenfelder 2000). Turbine engines are not required to be able to withstand the ingestion of a bird larger than 4 pounds. Eschenfelder (2000) concluded that these engine ingestion standards may be inadequate because they do not reflect the sizes and numbers of birds encountered in actual birdstrike incidents.

The wildlife species of concern list is based upon wildlife observations and strike data collected at PDX between 1997 and 2008, as well as body mass and flocking behaviors of species that frequent the airfield. This list is revised annually using the risk evaluation model developed by the Port based on the concepts/methodologies for risk and decision-making of Dr. J.R. Allan (2000) (Appendix A).The risk model is based on severity of impact and probability of occurrence. The greater the percentage of strikes resulting in damage for each species throughout the nation, the greater the potential "severity of impact" for the species in the risk evaluation model. The "probability of occurrence" is derived from a rolling five year average of strikes events at PDX. The 2009 update to the wildlife species of concern list, presented in Table 1, identifies those species for which further management actions are warranted to reduce the current wildlife strike hazard to aircraft at PDX. The list consists primarily of medium to large sized birds (raptors, waterfowl, and great-blue heron) and birds with a tendency to form flocks (i.e., waterfowl, European starling, gulls, rock pigeon) that frequent the airfield. No mammals were identified as wildlife species of concern by the model. The risk evaluation model was also used to revise the monitor list of wildlife presented in the 2003 Ecological Study for PDX (Table 1). Monitor species represent those for which available options and possible management actions should be reviewed for further actions to reduce the current strike hazard to aircraft at PDX. The monitor list is comprised

primarily of medium to large sized birds (raptors, waterfowl) and 2 mammals (coyote and black-tailed deer).

For the purposes of this revision of the WHMP, the *Wildlife Species of Concern* identified in Table 1 constitute those wildlife species deemed most hazardous to aircraft operations at PDX, while *Monitor Wildlife* represent those species determined to pose a lower risk to aircraft operations.

Table 1. Current (2009) list of wildlife species of concern and monitor species for PDX

Wildlife Species of Concern	Monitor Wildlife
American crow (450g) [a]	Bald eagle (4,325g)
Canada goose (1,600-4,500g lbs)	Barn owl (460g)
Great blue heron (2,400g)	Black-tailed deer (100-400 lbs)
Gulls (420-1,400g)	Coyote (9,080--22,700 lbs)
Mallard (1,100g)	European starling (82g)
Osprey (1,600g)	Great horned owl (1,400g)
Red-tailed hawk (1,080g)	Greened winged teal (350g)
	Wood duck
	Northern pintail (800g)

[a] Average body mass (Sibley 2000; Burt and Grossenheider 1980)

1.2.3. Wildlife Attractants

The geographical location of PDX within the historic Columbia River floodplain and along the Pacific Flyway predisposes the airfield to a significant wildlife presence that includes both resident and seasonal populations. Wildlife species of concern are attracted to areas in and around the airport because one or more of their basic needs (food, water and shelter) are available.

- Food sources for wildlife at PDX have been identified to include insects, earthworms, rodents, reptiles, amphibians, grasses and forbs, seeds, grains, fruits, human refuse and food handouts, among others.
- Water sources utilized by wildlife around airport property include ponds, river, sloughs, ditches, wetlands, stormwater facilities, temporary pools formed by rain, and outdoor water fountains.
- Wildlife find shelter and nesting opportunities in trees, shrubs, weedy brush, tall grass, riverside vegetation, landscaping, burrows, buildings, utility poles, signs, culverts and other manmade and natural structures on and around the airport.

All of the wildlife species of concern identified in Table 1 utilize the airfield and surrounding areas for one or more of these basic needs. See Appendix B for a graphic representation of how one of these species, the red-tailed hawk, uses the airfield. As the surrounding area has increased in urban density, the airport and adjacent golf courses (open spaces) have experienced increased use as resident and migratory wildlife seek out the remaining undeveloped open space. The risk evaluation process is continually applied to assess hazards and develop appropriate management strategies.

Food

Rodents, rabbits, earthworms, insects and other invertebrates are highly attractive as a food source for many species of birds and mammals at PDX. Gray-tailed voles and other small mammals appear to be primary attractants of red-tailed hawks, great blue herons and other predatory wildlife species of concern that hunt in and around the airfield. Open fields, pastures and golf courses adjacent to the airport provide feeding and loafing habitat for Canada geese. Airfield flyovers by large flocks of geese are also common during winter as geese move between various feeding and loafing sites and the Columbia River. Constant hazing by Wildlife staff is required to limit foraging by geese in the mowed grassy infield areas. Landscaping installed for aesthetic purposes can provide shelter as well as a food resource for wildlife species of concern if plantings seasonally produce palatable fruits or nuts. Trash, handouts and scattered refuse also provide a food source for species of concern, such as gulls and crows.

Water

PDX is situated along the south bank of the Columbia River within the historic flood plain for the lower Columbia River. Currently, Multnomah County Drainage District (MCDD) #1 maintains a system of levees, pumps, canals and sloughs to provide both flood protection and drainage control for the airport and the surrounding communities. Open drainage ditches and wetlands on the airfield create attractive habitat for wildlife species of concern year round, such as great blue herons and mallards. During periods of extended or heavy rain, areas of the airfield with insufficient slope or poor drainage create temporary pools of standing water that may attract wildlife species of concern. Summer irrigation of landscaped areas can create temporary pools of water that may be used for drinking and bathing by many species. Detention/retention ponds and swales used to contain and treat stormwater runoff create larger open water areas attractive to waterfowl and great blue herons. Wetlands, sloughs and ditches on lands adjacent to PDX, as well as the Columbia River itself, attract birds and mammals throughout the year, especially in fall, winter and spring when migratory waterfowl pass through the Willamette Valley. Airfield flyovers by mallards and other ducks are common as waterfowl move between the Columbia River and various water resources used as feeding and loafing sites.

Shelter

Wide varieties of natural, modified, and man-made features on and around PDX provide shelter and cover for wildlife species of concern or their prey. Shelter on the airfield is generally limited to man-made structures that can provide cover, nest sites and perches for wildlife species of concern (e.g., barn owl, American kestrel, and red-tailed hawk). A

wide variety of structures exist at PDX that may receive use by wildlife, including airfield buildings, aircraft hangars, terminals, parking structures, light poles, fences and navigational aids, among numerous others. Vegetative shelter on the airfield is generally limited to mowed grasslands that provide cover for rodents, the primary prey of raptor species of concern. Vegetative cover on lands adjacent to PDX is heavily fragmented and ranges from tall grass in areas infrequently mown to early seral shrub stands and remnant patches of forest. These habitats generally provide shelter for wildlife capable of utilizing disturbed areas and those that prefer open patchy habitats (red-tailed hawk, coyote). However this is dependent upon individual species needs and the interspersion of cover with other habitat requisites (e.g., food, water, nest sites). Landscaping installed for aesthetic purposes can also provide shelter for wildlife species of concern, depending upon the plant variety, planting patterns and planting densities chosen. Factors such as a plant's vertical growth pattern, branching arrangement, fruiting characteristics and persistence of vegetation (i.e., deciduous vs. evergreen) and proximity to open water features influence the frequency of use by wildlife species of concern.

1.2.4. Baseline Conditions at PDX

Wildlife habitats within 10,000 feet[2] of the PDX airfield were mapped by the Port's Natural Resources Inventory (NRI). The Port's regional (broad category) classification system was used for all non-Port owned lands within the 10,000-foot perimeter area (based on Johnson & O'Neil, 2000). Six regional habitat types and a no correlation category, comprising 12,832.2 acres, were documented. The no correlation category was created by the Port to address those areas that do not specifically fit into one of the regional habitat types. The Port's more detailed local classification system was used for Port owned lands within the 10,000-foot perimeter area. Thirty-five local habitat types comprising 3,784 acres were documented on Port-owned lands within the 10,000-foot perimeter. The NRI dataset for PDX was updated and field verified in 2007.

Almost all wildlife habitat types within the 10,000-foot perimeter area around PDX have the potential to support some use by wildlife species of concern. Even those habitats that provide little or no value may at times support these species in the course of general movements and/or dispersals. Human-made structures, such as buildings, light poles, signs, navigational equipment, and stormwater management facilities can serve as attractants to wildlife species of concern by directly providing habitat or enhancing existing habitat quality (e.g., perch or nest sites). In general, the more open, herbaceous dominated habitats are expected to be used for feeding and loafing by wildlife species of concern, while those habitats containing trees are used for nesting, roosting and perching. Scrub-dominated habitats, although attractive to some species, appear to receive limited use by wildlife species of concern. Habitat use patterns reflect the specific habitat preferences of the individual wildlife species of concern present around PDX, a complex interaction dependent upon such factors as habitat patch size, interspersion, fragmentation, quality and levels of disturbance, among others. Based on the aforementioned information, most habitats on and around PDX have the potential to attract wildlife that may pose a hazard to aircraft.

[2] Define as the 10,000 ft. separation criteria, FAA AC 150/5200-33.

General observations of wildlife (birds and mammals) and their behavior were collected at PDX from the mid nineties through 2002 to determine patterns of wildlife use in and around PDX. Since 2002 the AIRMAN database contains records of over 13 million wildlife observations comprised of 170 species of birds, 26 species of mammals, and 1 species of amphibian. These observations do not represent all wildlife that may occur on the airfield since wildlife observations generally emphasize those species that have the greatest potential to pose a hazard to aircraft (e.g., medium to large birds, birds that flock, behavioral patterns that place species in conflict with aircraft, mammals capable of accessing the runways and taxiways).

Based upon the above noted observations, generalizations can be made about some wildlife use patterns on and around PDX. Raptors are observed year-round at PDX, with peak observations coinciding with spring and fall migratory periods. Red-tailed hawks are the most commonly sighted raptor, followed by American kestrel, northern harrier, and osprey. Six resident red-tail hawk pairs have home ranges that include some portion of the airfield. In the last four years there has been an increase in bald eagle activity on and around the airfield. Waterfowl are extremely abundant around PDX during the fall and winter months with a smaller resident breeding population present in the spring and summer. Canada geese and mallards are the most commonly sighted waterfowl. Great blue herons and gulls are the most common wading and shorebirds present on and around the airfield. Great blue herons are observed throughout the year and gulls, although present year-around, are most prevalent during the fall and winter. European starlings are the most commonly sighted passerine followed by American crows and various swallow species. The annual abundance of starlings at PDX exceeds all other bird species combined. During the non-breeding season, starlings aggregate into large flocks that may travel many miles between roosts and feeding areas. Relatively few mammals are observed on and around PDX, with coyotes, rabbits and various small mammal species most commonly sighted on the airfield. Other mammals commonly sighted in the area of PDX are black-tail deer, raccoon, nutria, beaver, and feral cats.

Since wildlife observation data is often collected while completing other tasks, these observations are typically focused on birds considered to pose a potential hazard to aircraft, and often include multiple sightings of the same individuals. These observations cannot be used to track wildlife populations in the vicinity of PDX. However, this wildlife data does provide broad trends regarding the species of wildlife most commonly observed, the behaviors commonly demonstrated, and in what areas wildlife are most frequently seen.

1.3. WHMP Administration

1.3.1. WHMP Review and Revision [14 CFR 139.337f (6)]

Potential wildlife hazards at PDX are monitored daily and seasonally. The WHMP is reviewed at least annually or whenever an air carrier aircraft experiences a multiple wildlife strike, a damaging collision with wildlife or an engine ingestion of wildlife. An annual status report and confirmation of WHMP review is filed with the FAA prior to the annual Part 139 certification inspection. The PDX WHMP will be revised as necessary, when either the program or the hazards and issues at the airport change significantly, or every 5 years, whichever comes first. The PDX WHMP operates under delegation of authority from the PDX Airport Certification Manual (ACM)

1.3.2. FAA 14 CFR 139.337 Checklist

As previously noted, this WHMP meets FAA 14 CFR Part 139.337 requirements concerning wildlife hazard management on or around PDX, as well as addressing a much broader Aviation safety and security goal. 14 CFR 139.337(f) provides specific direction on what, at a minimum, shall be included in the WHMP. This section provides a roadmap to assist the FAA in locating those sections of the WHMP that address the Federal Aviation Regulations (FAR) requirements. The specific requirements outlined in 14 CFR 139.337(f) are presented below along with the corresponding section(s) of the WHMP that address each requirement.

14 CFR 139.337(f). The plan shall include at least the following:

1. A list of the individuals having authority and responsibility for implementing each aspect of the plan. **[Section 3.0]**

2. A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion: **[The management strategies in Sections 4.6 satisfy this requirement.]**

    i. Wildlife population management

    ii. Habitat modification; and

    iii. Land use changes

3. Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits. **[Section 2.0]**

4. Identification of resources that the certificate holder will provide to implement the plan. **[Section 5.0]**

5. Procedures to be followed during air carrier operations that at a minimum includes -

i. Designation of personnel responsible for implementing the procedures **[Sections 3.0]**;

ii. Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin **[Section 5.0]**;

iii. Wildlife hazard control measures **[Section 5.0]**; and

iv. Ways to communication effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower. **[Section 5.1.4.8]**;

6. Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in 14 CFR 139.337(b) that trigger a wildlife hazard assessment, including: **[Sections 1.2]**

    i. The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity; and

    ii. Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated.

7. A training program conducted by a qualified wildlife damage management biologist to provide airport personnel with the knowledge and skills needed to successfully carry out the wildlife hazard management plan required by paragraph (d) of this section. **[Section 6.0]**

Refer to Appendix C for the complete text of 14 CFR Part 139.337.

1.3.3. Wildlife Hazard Assessment

In compliance with the requirements of 14 CFR Part 139.337, three Wildlife Hazard Assessments were completed to develop the original PDX WHMP in 2003. This current version of the WHMP incorporates by reference the findings of all three studies[3]. Building on these baseline studies, PDX wildlife staff continue to collect data on wildlife presence and behavior on and around the airfield. The data is documented in the AIRMAN database and is utilized to annually reassess and validate current wildlife hazards at PDX.

[3] Included as appendices in the 2003 WHMP.

Figure 1. Portland International Airport project vicinity map

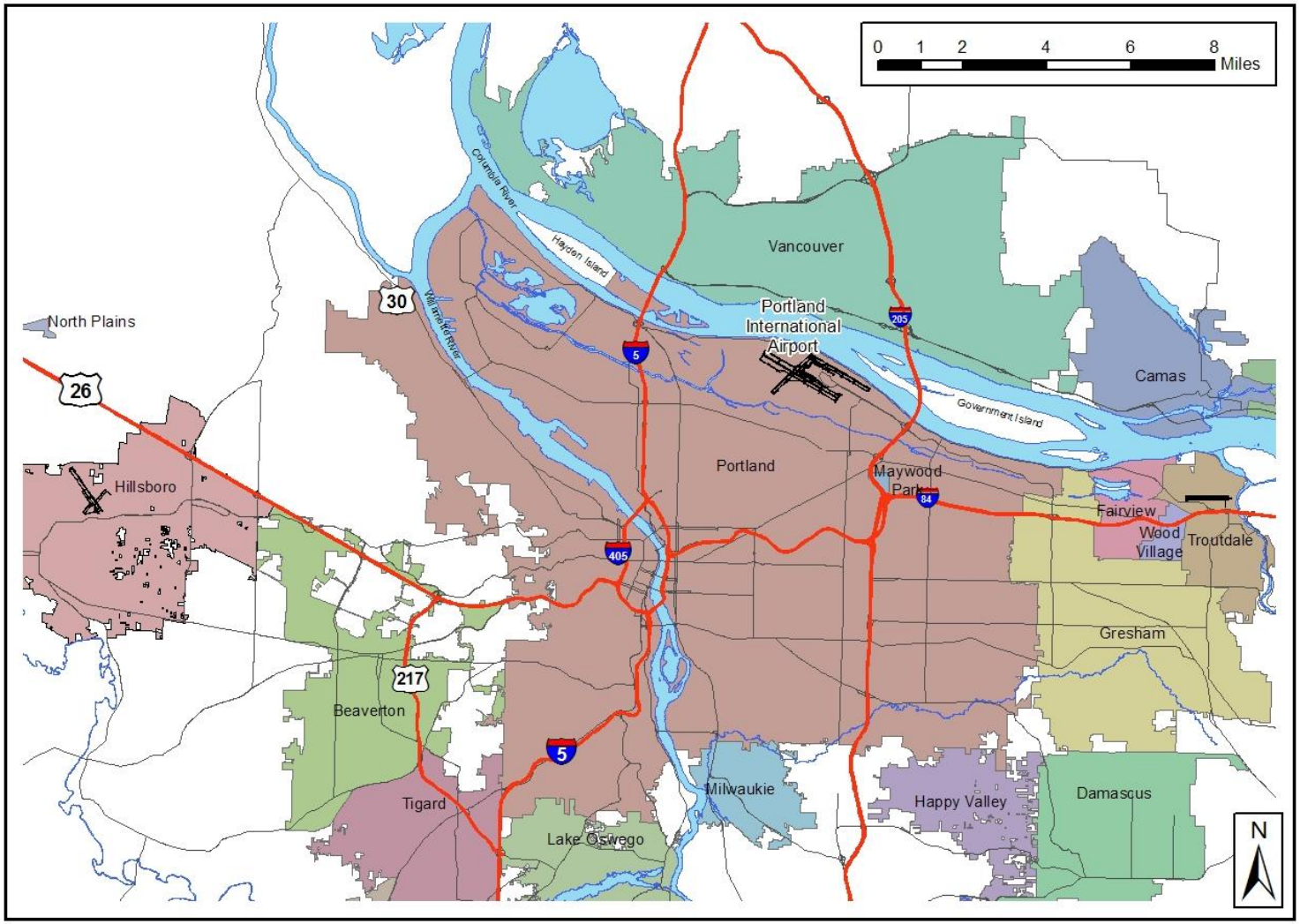
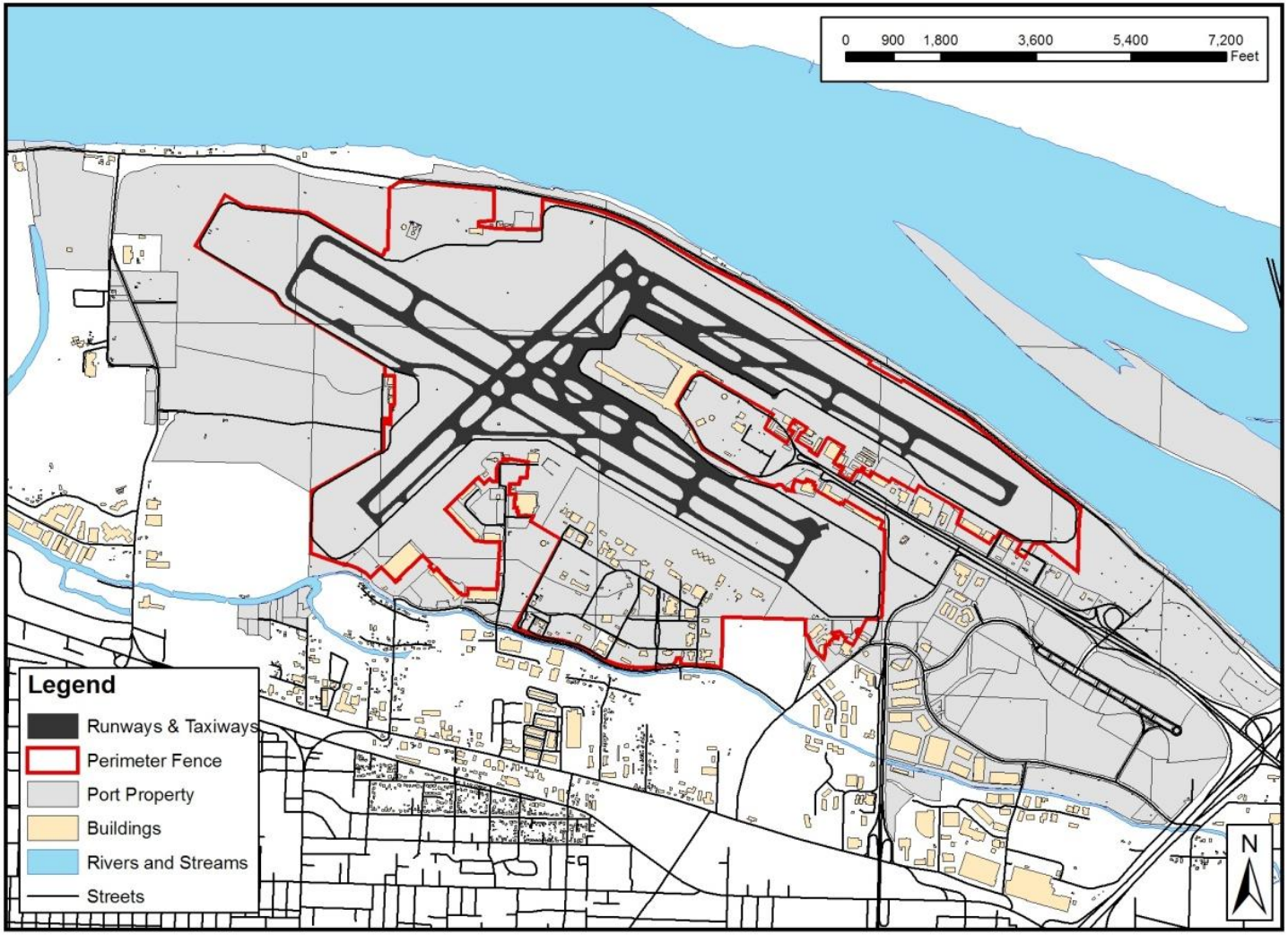


Figure 2. Portland International Airport facilities map.



2 APPLICABLE LAWS, REGULATIONS AND POLICIES [14 CFR 139.337f (3)]

Federal, state and local governments administer a variety of laws and regulations that protect wildlife and their habitats. Wildlife control activities at airports are influenced by many of these regulations. The Port complies with these laws and regulations as a part of standard operational practices.

Most wildlife management agencies issue permits to allow the harassment and/or take of certain wildlife species when required by extenuating circumstances. These special permits are especially relevant and necessary for implementation of a successful airport Wildlife Hazard Management program. Many of the regulatory requirements are interrelated, and the Port will continue to work collaboratively with the regulatory agencies in evaluating its WHMP implementation and ongoing compliance strategies.

This chapter provides a review of the following:

- Key provisions of relevant federal, state and local regulations;
- A general strategy for regulatory compliance;
- Permits the Port should obtain and routinely renew to implement the WHMP; and
- Internal Port policies that guide the development of wildlife hazard management strategies at PDX.

2.1. FAA Requirements

2.1.1. Airport Grant Assurances

FAA Airport Grant Assurances are contractual obligations incorporated into the provisions of FAA grants in support of airport improvement projects. These obligations are incurred upon acceptance of FAA funds by the “sponsor” [or Airport], and require the sponsor to “comply with all applicable Federal laws, regulations, executive orders, policies, guidelines and requirements” [reference Section C (1): General Federal Requirements]. Specific reference to the FAA Advisory Circulars is made in Section C (34) [Policies, Standards and Specifications], requiring the sponsor to “carry out the project in accordance with the …current FAA Advisory Circulars…”. These provisions, in

effect, give the guidance provided in the Advisory Circulars the weight of law, and contractually obligate the Port to comply. Additional provisions of the Assurances deal specifically with hazard removal and mitigation [Section C (20)], and compatible land uses [section C (21)], directing the sponsor to "take appropriate action" to ensure a safe airspace and to restrict incompatible land uses adjacent to the airport, insofar as possible.

To a large extent, these requirements form the basis for the Wildlife Hazard Management program at PDX, which is designed to be responsive to both the statement and the intent of the guidance.

2.1.2. 14 CFR Part 139.337

14 CFR Part 139.337(b) & (c) requires airports that service regularly scheduled commercial aircraft (carrying 10 or more passengers) to complete a wildlife hazard assessment if any of the following events occur on or near the airport:

- An air carrier aircraft experiences multiple wildlife strikes;
- An air carrier aircraft experiences substantial damage from striking wildlife;
- An air carrier aircraft experiences an engine ingestion of wildlife; or
- Wildlife of a size, or in numbers, capable of causing one of the above events are observed to have access to any airport flight pattern or aircraft movement area.

Information collected during the wildlife hazard assessment, including analysis of the events that prompted the assessment; the identification of observed species, their movements, numbers and locations; as well as wildlife attractants and recommended actions for reducing wildlife hazards to air carrier operations is then, at the FAA's request, incorporated into a WHMP as required under 14 CFR Part 139.337. The WHMP, which is submitted to and approved by the FAA prior to implementation, provides measures "to alleviate or eliminate wildlife hazards to air carrier operations" by identifying necessary habitat modifications and wildlife control measures, as well as the parties responsible for implementing identified actions.

This 2009 revision of the PDX WHMP updates the 2004 PDX WHMP which was authorized by the FAA on October 18, 2004. This 2009 update addresses revised FAA regulations, incorporates the findings of the Port's wildlife risk assessment process to date, accounts for changes to the program as it has matured over the last 5 years, and includes minor editorial corrections and restructuring.

FAA Advisory Circular (AC) No. 150/5200-33: Hazardous Wildlife Attractants On or Near Airports, provides FAA guidance to airport operators on the recommended locations of certain land uses that have the potential to attract hazardous wildlife relative to the location of the airport. It also provides guidance on airport development projects, including construction, expansion and renovation projects, affecting aircraft movements near hazardous wildlife attractants.

For an airport serving turbine-powered aircraft such as PDX, AC 150/5200-33 recommends that "hazardous wildlife attractants" be separated from the airport's air operations area (AOA) by a distance of 10,000 feet. The circular also recommends that

the approach, departure and circling airspace be separated from hazardous wildlife attractants by 5 statute miles if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

AC 150/5200-33 defines wildlife attractants as "any human-made structure, land use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace of the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, and wetlands". AC 150/5200-33 discusses land-use practices having the potential to attract hazardous wildlife and provides guidance on whether these land use practices are compatible or incompatible with safe airport operations if located within specified separation distances from the airport. The guidance also provides recommendations on alternatives for incompatible land uses, and suggestions on managing or correcting incompatible land uses to discourage the attraction of hazardous wildlife to airport facilities.

In accordance with the Grant Assurances, the Port adheres to the guidance in AC 150/5200-33 to ensure that the proposed wildlife management practices, including habitat modification and mitigation activities, are consistent with the recommendations provided in the circular. Refer to Appendix D for the complete text of AC 150/5200-33.

2.2. National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires that federal agencies study and disclose the effects of their proposed actions in either an Environmental Assessment (EA) or Environmental Impact Statement (EIS). Specifically, NEPA is triggered when an action requires a permit, entitlement, or funding from a federal agency; when an action is jointly undertaken with a federal agency; or when an action is proposed on federal land. Typically, federal agencies adopt guidance specific to actions that they undertake requiring NEPA compliance.

An Environmental Assessment (EA) was completed in 2004 for the implementation of the PDX WHMP, and a Finding of No Significant Impact (FONSI) was signed by the FAA on September 21, 2004. National Environmental Policy Act (NEPA) compliance for WHMP's is consistent with current guidance found in FAA Order 5050.4B, Chapter 2, Section 209. This administrative update of the PDX WHMP does not appreciably change in any way the protocols, management strategies and operational procedures of the PDX Wildlife Hazard Management program as assessed by the 2004 EA, and satisfies the requirements of a Categorical Exclusion under the provisions of FAA Order 1050.1E,section 308e

2.3. Other Applicable Federal Regulations

2.3.1. Clean Water Act, Section 404:

Activities that result in a discharge of dredged or fill material into waters of the United States are regulated by the U.S. Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA). Discharges of dredged or fill material into waters of the United States, including wetlands, generally require a permit from USACE.

Several waters of the United States, including on-site wetlands, have been identified on and around the PDX airfield. If activities designed to manage wildlife hazards would result in the discharge of dredged or fill material into a jurisdictional water of the U.S., the Port would apply for a permit from USACE before completing such activities. In Oregon, this is accomplished via a joint permit process with the Oregon Division of State Lands (ODSL) (See Section 2.4.1). Mitigation for impacts to jurisdictional wetlands will be mitigated off-site outside of the 10,000 ft. separation criteria as established in FAA AC 150/5200-33.

2.3.2. Endangered Species Act (16 USC 1531-1543, Endangered Species Act of 1973, As Amended)

Section 7 of the Endangered Species Act (ESA) requires all federal agencies, in consultation with the US Fish and Wildlife Service (USFWS) and the National Oceanic Atmospheric Administration (NOAA) Fisheries, to ensure that their actions do not jeopardize the continued existence of species listed as endangered or threatened, or result in the destruction or adverse modification of the critical habitat of these species. Section 7 provides that if a federal action "may affect" a listed species, the federal agency must consult with the USFWS or NOAA Fisheries to determine whether the action is "likely to adversely affect the species," in which case the agency must formally consult on the action in order to obtain a Biological Opinion issued by the USFWS or NOAA Fisheries that authorizes the take. Section 9 defines "Take" to include harassing, harming, pursuing, hunting, wounding, killing, capturing, or attempting such activity.

Several federally listed animal species have the potential to occur on or adjacent to PDX. If proposed wildlife management activities may affect a listed species, the federal lead agency involved with the proposed action (e.g., FAA, USACE) will consult with the USFWS and/or NOAA Fisheries.

2.3.3. Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits the take of any migratory bird, and any part, nest or eggs of any such bird. Take under the MBTA is defined as the action of or attempt to “pursue, hunt, shoot, capture, collect, or kill”. The MBTA is administered by the USFWS. Migratory birds listed under the ESA are managed by the agency staff handling compliance with Sections 7 and 10 of the ESA; management of all other migratory birds is overseen by the Migratory Bird Division of the USFWS.

Numerous migratory birds use habitats on and around PDX. Since wildlife management activities could affect any of these birds, the Port has consulted with and obtained an Airport Depredation permit from the USFWS, which includes a depredation permit for lethal actions (See Section 2.6).

2.3.4. Bald and Golden Eagle Protection Act

The Bald Eagle Protection Act of 1940 provides for the protection of bald and golden eagles by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The act allows take, possession and transportation of bald and golden eagles for scientific, educational, and Native American religious purposes, or in circumstances when take may be necessary to ensure the protection of wildlife, agriculture, or other interests particular to a specific locality. The act also allows for take of eagle nests that interfere with resource development or recovery operations. Prior to taking, possessing, or transporting any bald or golden eagle, or golden eagle nest, a permit must be obtained from the USFWS.

Since wildlife hazard management practices at PDX require interactions with bald eagles the Port has consulted with the USFWS staff and obtained and maintains an Eagle Depredation Permit.

2.4. State of Oregon Regulations

2.4.1. Oregon Removal Fill Law

Similar to Section 404 of the Clean Water Act, Oregon's Removal-Fill Law (ORS 196.795-900) regulates activities that would result in the removal or fill of material into waters of the state. Waters of the state include natural waterways, intermittent streams, constantly flowing streams, lakes, and wetlands. The ODSL administers the Removal-Fill program.

If proposed wildlife management activities at PDX could result in a discharge or removal of material into or from a water of the state (e.g., wetlands, on-site slough), the Port will consult with ODSL staff and apply for a Removal-Fill permit, as appropriate. In Oregon, this is accomplished via a joint permit process with the USACE. Mitigation for impacts to jurisdictional wetlands will be mitigated off-site outside of the 10,000 ft. separation criteria as established in FAA AC 150/5200-33.

2.4.2. Oregon Endangered Species Act

Similar to the federal ESA, Oregon's ESA offers protection to species listed as threatened or endangered under the Oregon ESA (ORS 496.002 through 496.192). However, the Oregon ESA is much more limited in scope and applies only to state agencies taking actions on state-owned or leased lands. Oregon's ESA is administered by ODFW.

Several state listed species could occur at PDX. However, in practice, compliance with the Oregon ESA is typically achieved during consultations with the federal agencies pursuant to the federal ESA.

2.4.3. Oregon Administrative Rules 635-43-0000 [Scientific Taking Permit]

Under Oregon Administrative Rules (OAR) 635-43-0000 to 0045, a Scientific Taking Permit is required to capture or handle the following wildlife in Oregon:

- Endangered species (OAR 635-100-125: green sea turtle, leatherback sea turtle, short-tailed albatross, brown pelican, Aleutian Canada goose, American peregrine falcon, arctic peregrine falcon, California least tern, gray wolf, gray whale, sei whale, sperm whale, blue whale, humpback whale, black right whale, fin whale, and gray wolf);
- Threatened species (OAR 635-100-125: loggerhead sea turtle, Pacific Ridley sea turtle, bald eagle, western snowy plover, northern spotted owl, marbled murrelet, kit fox, wolverine, and sea otter);
- Game birds (ORS 496.007 - members of the following avian families: Anatidae (swans, geese, brant, river ducks, sea ducks), Columbidae (mourning doves and band-tailed pigeons), Tetranidae (grouse, ptarmigan prairie chickens), Phasianidae (pheasants, quail, partridge), Meleagrididae (wild turkey), Scolopacidae (snipe, woodcocks), Gruidae (cranes) and Rallidae (rails, gallinules, coots);
- Fur-bearing mammals (ORS 496.004(8): beaver, bobcat, fisher, marten, mink, muskrat, otter, raccoon, red fox, and gray fox);
- Game mammals (ORS 496.004(9): antelope, black bear, cougar, deer, elk, moose, mountain goat, mountain sheep, and silver gray squirrel; and
- Other wildlife protected under OAR 635-44-130 (includes a number of rare native amphibians, reptiles, and mammals as well as all non-game birds except European starling, house (English) sparrow, and rock dove.

Since wildlife hazard management practices at PDX may require that some species be collected, trapped and released, or salvaged for scientific purposes, the Port holds a Scientific Taking Permit from ODFW (See Section 2.6).

2.4.4. Oregon Administrative Rules 635-043-0051 to 0115 [Take or Harass Wildlife Permit]

Under OAR 635-043-0051 to 0115, a property owner must obtain a Wildlife Harassing Permit from ODFW before harassing any wildlife on their property. Harassment is defined as any act that frightens or chases, but does not kill, wildlife. Harassment can be employed for scientific purposes pursuant to an ODFW program; to offer protection against a threat to human safety; to offer protection of land or property from damage; for

wildlife management purposes pursuant to ODFW programs; or for rehabilitation of sick, injured, or orphaned wildlife. A Wildlife Harassing Permit is not required of those persons possessing a valid federal migratory bird permit authorizing harassment of migratory bird species.

The current federal migratory bird permit that the Port maintains on an annual basis meets the ODFW state requirements under OAR 635-043-0051 to 0115 (See Section 2.6).

2.4.5. Oregon Administrative Rules 837-012-0305 to 0370 [Agricultural Fireworks Permit]

Under OAR 837-012-0305 to 0370, a landowner must obtain an Agricultural Fireworks Permit to scare away or repel birds or animals that injure crops or agricultural products. Permits are issued in-two year blocks by the Office of State Fire Marshal.

Under the provisions of this administrative rule, the airfield at PDX is considered equivalent to other agricultural areas in the state of Oregon. Because wildlife hazard management practices at PDX require the use of pyrotechnics, the Port holds an Agricultural Fireworks Permit from the State Fire Marshal (See Section 2.6).

2.4.6. Statewide Planning Regulations

The purpose of the State of Oregon's Airport Planning Division 13 is to implement ORS 836.600 through 836.630 and Statewide Planning Goal 12 (Transportation). The policy of the State of Oregon is to encourage and support the continued operation and vitality of Oregon's airports. These rules are intended to promote a convenient and economic system of airports in the state and for land use planning to reduce risks to aircraft operations and nearby land uses. This division also ensures the vitality and continued operation of Oregon's system of airports is linked to the vitality of the local economy where the airports are located. This division recognizes the interdependence between transportation systems and the communities on which they depend (OAR 660-013 Airport Planning).

The Oregon Department of Aviation has developed a guidebook to aid in compatible land use planning. It contains the means and requirements for local governments and those interested in Oregon aviation to comply with airport land use compatibility. The guidebook provides the tools to assist local governments, planners, airport administrators, and citizens wishing to update the aviation transportation element of their comprehensive plan (Airport Land Use Compatibility Guidebook, January 2003).

2.5. City of Portland Regulations

The City of Portland recognizes the PDX airfield as a dedicated use subject to federal regulation and is therefore not subject to City code administration.

> "The Airside portion of the site includes the airfield and all related development, which includes, but is not limited to runways, taxiways, aviation approach lighting systems, navigational beacons, associated equipment sheds and security fencing. Activities occurring in this portion of the site are considered flight operations and are subject to the requirements of the Federal Aviation Administration and Federal Aviation Regulation (FAR) which are issued by the FAA. This area, depicted on a map found at Exhibit G-7, is not subject to City code administration. Accordingly, development related to the Airside portion of the site is neither subject to the development regulations of the City, nor does the City review or issue building permits for the development within the airfield" (LU 02-146814 CUMS CU AD, 2003).

Aviation owned properties other than the Airside portion are subject to City code administration with the following exceptions. Within 300 feet outside of the airfield security fence City landscaping standards are superseded by the WHMP Landscaping Standards (found in section 5.2.4) and tree cutting regulations are waived (LU 02-146814 CUMS CU AD, 2003).

2.5.1. City of Portland, Title 33, Planning and Zoning

The zoning code outlined in Title 33 implements the City of Portland's Comprehensive Plan and related land use plans within the city limits. The code uses a combination of nondiscretionary and discretionary reviews to evaluate land use proposals for compliance with the use and development requirements of the code. A nondiscretionary review occurs when requests for uses and development specifically meet the provisions laid out in the zoning code. A discretionary review is required if a proposal does not meet the specific requirements of the code, requiring that judgment or discretion be applied to determine if the project meets the approval criteria.

The following provides a summary of two of the chapters in Title 33 that may require the Port to enter into the discretionary land use review process with the City of Portland.

Chapter 430, Environmental Zone Overlays

To protect resources and functional values of certain areas, the City of Portland has identified Environmental Protection (EP) Zones and Environmental Conservation (EC) Zones in its zoning code. The Environmental Protection Zone is applied wherever the City determines that highly significant resources and functional values are present. Development in these areas is typically only approved under rare and unusual circumstances. The EC Zone is applied wherever the City determines that significant resources and functional values are present. These areas are located where the resources and functional values can be protected, while still allowing environmentally sensitive urban development.

Although no Environmental Zones lie within the fenced perimeter of the airfield (i.e. Airside), numerous designated EC and EP Zones occur in the immediate vicinity of the airport (Figure 3). Some of these Environmental Zones do lie on Port-owned property around the airport. EC Zones identified around PDX are associated with the banks of the Columbia River, the Columbia Slough, the Elrod Canal, portions of the Elrod mitigation site, parts of Alderwood Slough at the PIC and a riparian area adjacent to the Economy Parking Lot. Areas classified as EP Zones include portions of the Columbia slough, most of the Elrod mitigation site and much of Alderwood Slough. If wildlife hazard management practices would result in the removal or modification of resources in any of these areas, the Port will go though the discretionary land use review process with the City of Portland, as outlined in Title 33.

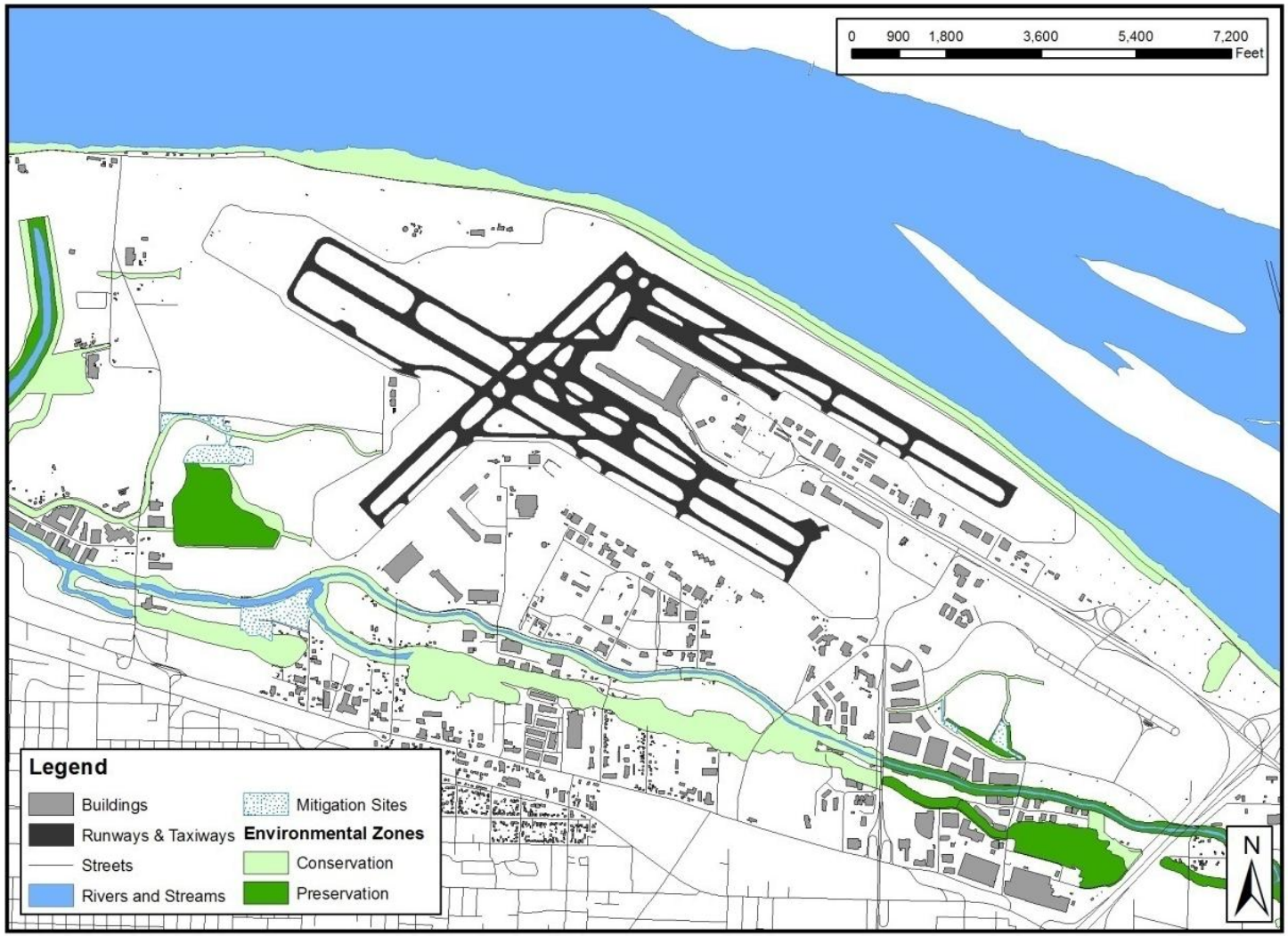
Chapter 248, Landscaping and Screening

Title 33, Chapter 248 outlines the City of Portland's requirements for landscaping and screening, including guidelines on landscaping standards for specific areas, preferred plant materials, tree protection, installation and maintenance, and monitoring. Since PDX is zoned "general industrial 2 (IG2)", landscaping must meet the L1 requirements of Chapter 248. If the Port cannot meet these landscaping requirements due to wildlife hazard management concerns or vertical intrusion issues, the Port will consult with City staff regarding the discretionary land use review process of the City of Portland, per Title 33, for a variance.

City of Portland, Code 14A.60.020, Firearms Discharge

The City of Portland Code 14A.60.020 generally prohibits the discharge of firearms in the City, except for those personnel specifically listed in the code. On May 26th, 2004, the code was amended to allow "employees or contractors of the Port of Portland engaged in flight safety hazard abatement at and around Portland International Airport to comply with FAR Part 139.337" to discharge firearms in the course of their duties for wildlife control.

Figure 3. City of Portland designated Environmental Zones in the vicinity of Portland International Airport



2.6. Permits

The Port shall apply for, obtain and/or renew all necessary federal and state permits required to control wildlife on, and in the vicinity of, the airfield. Table 2 provides a summary of the potential federal, state, and local permits that the Port may be required to obtain prior to implementing wildlife hazard management practices at PDX. Copies of the current permits issued to the Port for wildlife control can be found in Appendix E.

Table 2. Potential Federal, State, and Local permits required for wildlife hazard management practices at PDX.

Applicable Law	Issuing Agency	Trigger	Type of Permit
Federal			
Section 404, Clean Water Act (CWA)	USACE	Discharge of dredged or fill material into a water of the US.	CWA Section 404 Permit
Endangered Species Act	USFWS / NOAA Fisheries	Take, including harassment, of a federally listed species, or destruction/adverse modification of their critical habitat.	Biological Opinion
Migratory Bird Treaty Act	USFWS	Take (pursue, hunt, shoot, capture, collect, or kill) of a migratory bird. Includes depredation and use of lethal force.	Migratory Bird Permit - Depredation Permit
Bald & Golden Eagle Protection Act	USFWS	Take, possession, or transport of a Bald or Golden Eagle, or their nest.	Eagle Permit
Removal-Fill Law	DSL	Removal or fill of materials into waters of the state.	Removal-Fill Permit
OAR 635-43-0000	ODFW	Capture or handling of fur bearing mammals; threatened or endangered species; game birds or mammals; or wildlife protected under OAR 635-44-130.	Scientific Taking Permit - Salvage

OAR 635-043-051	ODFW	Harassment of wildlife.	Wildlife Harassing Permit (unless applicant has Migratory Bird Permit)
OAR 837-12-305	Office of State Fire Marshall	Storage and use of fireworks to scare or repel birds or animals from the airfield.	Agricultural Fireworks Permit
Title 33, City of Portland, Planning and Zoning	City of Portland	Proposed activities in a designated Environmental Protection Zone or Environmental Conservation Zone [Chapter 430] Proposed activities that would not meet L1 Landscaping Requirements [Chapter 248].	Conditional Use Permit
Chapter 20.42, City of Portland Code and Charter	City of Portland	Tree removal	Tree Cutting Permit

In implementing the WHMP, the Port will continue to consult with the applicable regulatory and resource agency personnel as appropriate. Since many of the proposed wildlife hazard management activities represent a continuation of current practices, it is anticipated that current permits, approvals and authorizations will be renewed. Prior to initiating any new activities, the Port will secure any required permits or approvals.

2.7. Port of Portland Goals, Policies and Procedures

The 2009 Wildlife Hazard Management Plan (WHMP) must demonstrate how it fits within and supports the stated missions of the Port of Portland and the Aviation Division, and how it is guided by Port and Aviation policies. The WHMP is an operational safety plan nested within the Aviation Safety and Security goal, which directly supports the Aviation and Port Mission Statements.

A summary of key mission statements, goals, and Port policies is provided below.

2.7.1. Port Mission Statement

"The mission of the Port of Portland is to provide competitive cargo and passenger access to regional, national, and international markets while enhancing the region's quality of life."

Aviation Mission Statement

"To operate, maintain, and promote an airport system that satisfies the air transportation needs of our customers by providing competitive cargo and passenger access to regional, national and international markets."

Aviation Safety and Security Goal:

"Ensure Aviation meets or exceeds all federal and state mandates to provide a safe and secure environment for airport users, employees, and tenants."

Wildlife Hazard Management Program Goal:

"To control wildlife hazards to aircraft operations through non-lethal means when possible by focusing on intensive hazing and harassment, and long-term habitat modifications."

Decision making for routine, every day wildlife hazard management issues resides at the Aviation Natural Resource Manager or the Aviation Wildlife Manager levels, however, the ultimate decision maker for Aviation is the Director of Aviation. Wildlife hazard issues and management recommendations are but one of many factors that influence the business decisions that the Director of Aviation must make to ensure accomplishment of the Aviation Mission (see Figure 4).

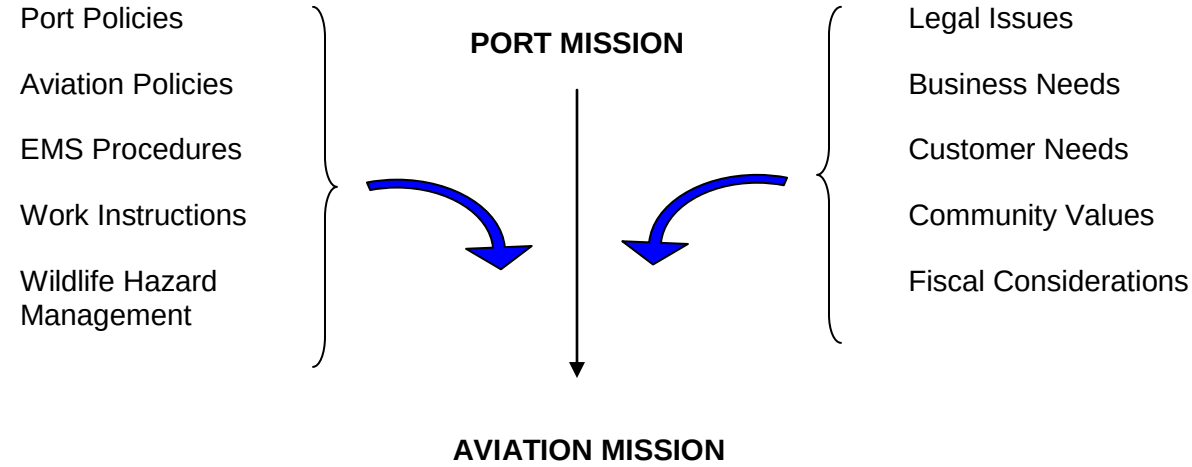


Figure 4. Representation of key decision-making factors considered by the Director of Aviation.

Port of Portland Environmental Management System (EMS)

This plan was developed and is compliant with ISO 14001 guidelines. The adaptive management aspect of this plan incorporates the primary components of a successful environmental management system (EMS). This includes planning, implementation, checking and review of actions to ensure they meet the objectives of the environmental policy.

The Port developed an integrated Environmental Management System (EMS) in 2000. The EMS was developed to enable the Port to effectively manage the full range of complex environmental issues, both regulatory and non-regulatory, in support of the Port's operational mission. The Port's EMS outlines specific Port policies and procedures that guide and inform internal Port decision-making in the implementation of the Port mission.

Port of Portland Environmental Policy (6.1.11)

"The Port of Portland will achieve its mission through responsible environmental stewardship and the implementation of proactive environmental programs. The Port will integrate environmental considerations into all aspects of its strategic planning and business decision-making."

Port of Portland Environmental Natural Resources Policy (7.4.11)

"The Port will seek opportunities to enhance and sustain Natural Resources as part of its planning, development and operations activities. Natural Resources means the native vegetation, fish and wildlife influenced by the Port's activities; the relationships among them; and the physical processes that sustain them."

2.7.2. Discussion of Port Policies

The WHMP must operate within the parameters set by the mission statements, goals, and policies listed above. This requires that the Port address environmental stewardship concerns and aviation safety needs concurrently. The WHMP works within the framework of these objectives through careful planning, risk evaluation, and analysis of available wildlife control options. While the priority of this program is aviation safety, the Port's commitment to environmental stewardship will continue to ensure that impacts to natural resources are avoided or minimized to the extent practicable.

3 PROGRAM ORGANIZATION, ROLES AND RESPONSIBILITIES [14 CFR 139.337f (1) & (5i)]

The Program Organization, Roles and Responsibilities chapter provides an overview of the Port's larger Wildlife Hazard Management program, as well as a discussion of the roles and responsibilities of the various staff, advisors, committees, and departments at the Port that are most closely involved in and responsible for implementation of the WHMP.

3.1. Program Organization

The responsibility for developing habitat management strategies on airport properties, and managing the undeveloped properties that border the airfield lie within the Aviation Natural Resource Manager's program within the current structure of the Aviation Environmental & Safety Department. Therefore, responsibility for the Wildlife Hazard Management program was put under this position. Additional staffing and resources (see the program organization in Figure 5) are dedicated to the Wildlife Hazard Management program that incorporates a dedicated dawn-to-dusk hazing and harassment program (short-term operational strategies), a research and development component, long-term management strategies, and a proactive public information and education program.

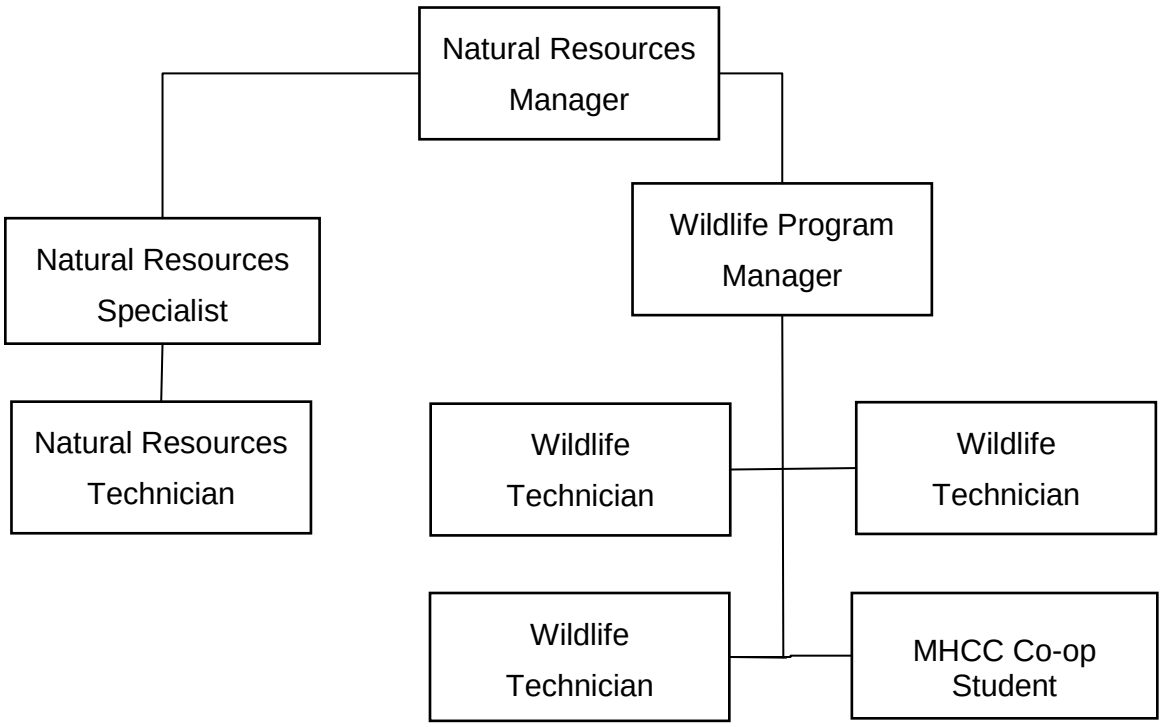


Figure 5. Port Wildlife Management Program organization effective 01/08.

3.2. Roles And Responsibilities of The Director Of Aviation

The relevant responsibilities of the Director of Aviation are as follows:

- Provide the decision-making authority for major program decisions, controversial issues or conflict resolution in support of the Aviation Mission.
- Coordinate major WHMP decisions with other Port directors.

3.3. Roles and Responsibilities of Wildlife Staff

The following text provides an overview of the roles and responsibilities of Port staff involved in the PDX wildlife program. Additional detail regarding roles and responsibilities is documented within the Port's EMS fish and wildlife management procedure and associated work instructions.

3.3.1. Aviation Natural Resource Manager

The relevant responsibilities of the Aviation Natural Resource Manager are as follows:

Program Management:

- Provide both strategic guidance and operational direction to the program.
- Serve as the decision maker for significant issues at the program level. Elevate issues to the Director of Aviation as appropriate.
- Authorize the budget for the Wildlife program.
- Participate with local, state, and federal agencies on land use decisions that could attract wildlife species of concern to properties around the airport.

Communication:

- Keep the Director of Aviation, Manager of Aviation Environmental and Safety briefed on program progress, management activities, and controversial issues, and relay management guidance to members of the wildlife program.
- Actively engage the regulatory agencies, Port staff, and the public in dialog to foster the management objectives of the program.

3.3.2. Wildlife Manager

Program Operations and Maintenance:

- Supervise the PDX Wildlife Program staff.
- Develop and implement annual work plans and budgets for the Wildlife program.
- Prepare annual report, including documentation of WHMP review and training records to FAA prior to the annual Part 139 inspection. Brief the FAA on the WHMP during the annual Certification Inspections.
- Will prepare and submit or validate all strike reports at PDX with the FAA.
- Serve as the technical area expert for PDX and all Port owned General Aviation facilities (Hillsboro and Troutdale Airports) on wildlife hazard management issues and regulatory requirements.
- Oversee raptor trapping and relocation program. Integrate these activities with other wildlife management activities ongoing at PDX.

- Obtain the required permits for wildlife control activities, write and submit annual reports for permit renewals. Coordinate with agency staff regarding permit additions or changes.

- Analyze wildlife data, seasonally and annually, for identification of significant trends or new hazards. Along with the Aviation Natural Resource Manager, determine how to respond to new or increasing hazards.

- Review construction and maintenance projects to determine if there will be an impact to the WHMP. Screen design features and landscaping plans for wildlife attractants and recommend modifications.

- Fill shifts as needed to cover the hazing schedule.

Communication:

- Serve as the primary Wildlife Hazard Management program liaison with the FAA, Oregon Air National Guard, and other federal, state, and local agencies.

- Participate in educational, outreach, or program awareness activities both within the Port, PDX, and in the larger community and conduct media briefings as requested.

- Keep the Director of Aviation, Manager of Aviation Environmental and Safety, and the Port Environmental Core Team briefed on program progress, management activities, and controversial issues, and relay management guidance to members of the wildlife program.

- Brief other Port Departments on WHMP programs and coordinate issues that overlap with programs of other Port Natural Resource Managers and the Natural Resource Program Manager.

- Chair the PDX Wildlife Advisory Committee to get input from outside agencies and interest groups on the Wildlife Hazard Management program.

Scheduling and Training:

- Supervise and train the Wildlife Technicians and Wildlife Technician Co-op students.

- Develop and present the Aviation Wildlife Hazard Training Module to the Airport Operations Supervisors.

- Maintain an ongoing intensive hazing schedule to cover all daylight hours.

- Maintain training records for annual Part 139 Certification inspection.

3.3.3. Wildlife Technicians

Program Operations:

- Respond immediately to alleviate any wildlife hazards observed or reported.
- Conduct physical inspections and patrols of the airfield to conduct wildlife control measures and keep accurate log of these activities in AIRMAN database.
- Report significant wildlife activity to the Airport Operations Supervisor if it impacts a movement area or is an immediate threat to aircraft operations.
- Handle and transport wildlife removed from the airfield to the appropriate rehabilitation, relocation or disposal sites.
- When a strike occurs, gather the information needed to report to the FAA and pass all information on to Wildlife Manager.
- During the fall and winter months inspect properties adjacent to airfield for migratory waterfowl and coordinate dispersal with Port Ops and Comm. Center.
- Trapping of diurnal raptors and maintenance of traps and trapping equipment.
- During the spring, conduct inspections of the property adjacent to the airfield for nesting waterfowl. Follow approved protocol for the addling of eggs.
- Maintain wildlife control equipment.
- Coordinate needed wildlife control projects such as installation of anti-perching material, testing of new equipment, etc.
- Communicate new or increasing wildlife hazards to the Wildlife Manager. Also report the effectiveness of current wildlife control activities.
- Assist the Wildlife Manager with training of new Wildlife Technicians or Interns.

3.3.4. Wildlife Co-Op Students

Program Operations:

- Conduct physical inspections and patrols of the airfield to conduct wildlife control measures as assigned by the Wildlife Technicians or Wildlife Manager.
- Handle and transport wildlife removed from the airfield to the appropriate rehabilitation, relocation or disposal sites.
- Maintain accurate and current logs of all wildlife activity and record all data in AIRMAN.
- Maintain wildlife control equipment.
- Conduct a weekly avian point count for population monitoring.
- Monitor the airfield for areas of mole activity and trap as needed.
- Assist the Wildlife Manager and Wildlife Technicians with research and projects as needed.

3.4. Roles and Responsibilities of Other Port Departments

The Port recognizes that the cooperation of many departments within the Port, both in Aviation and in other divisions, is necessary for the successful implementation of the WHMP. Detailed roles and responsibilities matrices have been developed as part of the Port's EMS. A summary of the Airport Operations department and their identified points of coordination with the WHMP are included in the following section. Because of the close day to day working relationship between the Wildlife and Airport Operations departments, this is the only other Port department specifically outlined in this document. (See 2004 WHMP for additional detail regarding cooperation with other departments).

3.4.1. Airport Operations Department

Manager, Airport Operations

- Per the ACM, delegate development, maintenance, and implementation of the WHMP to the Aviation Natural Resource Manager.
- Coordinate with the Wildlife Manager during the annual Airport Certification Inspection, and with any certification issues that arise outside of the inspection cycle.
- Provide direction to the Airport Operations Supervisors regarding the WHMP implementation policies and guidelines.

Airport Operations Supervisor (AOS) Responsibilities

- Monitor and disperse wildlife, as needed during airfield inspections.
- Report unusual or hazardous wildlife sightings and coordinate with the Wildlife Technicians on issues that impact movement areas, or require additional staff to mitigate.
- Coordinate daily wildlife control duties with the FAA Air Traffic Control Tower if needed.
- Inform Wildlife staff whenever there is unusual weather, security, or emergency conditions that affect their access to the airfield.
- Provide movement area access to Wildlife staff. This can be through approval to coordinate with the tower directly, or by escorting Wildlife staff into restricted areas if the situation requires.
- Follow wildlife management protocols outlined in AOS Training Module 9.
- Gather information about wildlife activity or strikes and respond to wildlife situations on the airfield when Wildlife staff is not on duty, including throughout nighttime hours.

4 IMPLEMENTATION STRATEGIES [14 CFR 139.337f (2) &(6)]

Both management strategies and general operational strategies will be used to effectively implement the WHMP. The management strategies are based on four program components or "pillars" that tie together to address both the short and long term wildlife and habitat management needs at PDX.

4.1. Risk Evaluation Process

The Port has identified a need to document the systematic approach that is used to assess wildlife hazards at the airport and prioritize actions based on the relative levels of risk they create. To accomplish this task, the Port has developed a pro-active, adaptive process to identify wildlife hazards, assess risks and prioritize management actions that are responsive to the relevant species and their use of both natural and man-made features on and around the airport. The potential risk is determined by considering the potential for a particular species to cause physical damage to an aircraft and the probability of occurrence that the species would be involved in a collision at PDX. The Port can identify and examine potentially undesirable interrelated/interdependent effects of its actions prior to implementation of proposed management strategies.

This formal risk evaluation approach utilized by the Port builds on the body of work of Dr. J. R. Allan, adapting it to the site-specific issues at PDX. This process is designed to evolve over time as new information and real world application provide direction.

The potential severity of impact and probability of occurrence are rated as high, medium, or low for each of the relevant species at the airport and placed in a risk matrix. Based on the results of these evaluations, the Port is able to prioritize risk management activities and ensure that risk-based decision-making is used throughout the wildlife hazard management process. The risk evaluation model is included as Appendix A.

4.2. Zone Concept

FAA Advisory Circular 150/5200-33 provides guidance on the siting of certain land uses that have the potential to attract hazardous wildlife on or near public-use airports (Appendix D). At airports serving turbine-powered aircraft such as PDX, the FAA recommends a separation distance of 10,000 feet be maintained between the AOA and new land uses deemed incompatible with safe airport operations (e.g., municipal solid

waste landfills, wastewater treatment facilities, wetland mitigation projects). Existing land uses within this zone (e.g., retail, storm water detention facilities, golf courses) may be compatible with airport operations if there is no apparent attraction to hazardous wildlife, or if wildlife hazard management efforts effectively eliminate or contain the hazard. It should be noted that the identification of hazardous wildlife and hazards is an ongoing process at PDX. AC 150/5200-33 also recommends against siting certain hazardous wildlife attractants within a 5-mile radius of the AOA if they may cause hazardous wildlife movement into, or across, the approach or departure airspace.

In compliance with FAA regulations PDX established a Wildlife Hazard Management program that addresses issues within a 10,000-foot radius of the airport's AOA. Nationally, approximately 60% of all bird-aircraft strikes occur below 100 feet AGL, and 73% occur below 500 feet AGL (Cleary et al. 2007). At airports, this low altitude generally corresponds with aircraft that are in either the departure or landing phase of flight. Therefore, wildlife hazard management actions taken within this 10,000-foot area have the greatest likelihood of reducing the incidence of wildlife strikes by aircraft at PDX.

For management prioritization the Port has divided the FAA's 10,000-foot area around the AOA at PDX into 3 zones: the Primary Zone, the Intermediate Zone and the Secondary Zone. This tiered approach to wildlife hazard management is based on the premise that the potential risk posed by a hazard increases with proximity to aircraft operations. A brief description of these 3 zones follows. Refer to Figures 6, 7 & 8 for a map of these zones.

4.2.1. Primary Zone

The Primary Zone (Figure 6) is defined as the area within the airfield perimeter fence, a 300-foot buffer around the perimeter fence, and the runway protection zones (RPZs) located at the end of each runway. The airfield perimeter fence establishes a secure perimeter to the immediate airfield for safety and security reasons, including terrestrial wildlife exclusion. The RPZ is established by the FAA in AC 150/5300-13, and creates a profile of the approach and transition surfaces. FAA requires the maintenance of a clear, safe airspace for aircraft landings and departures. Risk to aircraft is greatest during takeoff when aircraft are likely to be at their maximum payload and thrust, and have limited maneuverability.

The Primary Zone has been approved for exemption from City of Portland regulations including landscaping and from permitting under Title 20.42 – Tree Cutting through prior Conditional Use Master Plan (CUMP) approvals (LUR 93-174-MS AD; LU 02-146814 CUMS CU AD).

Land management decisions within the Primary Zone are subject to the single dedicated land use of operating an airport and the associated public aviation safety concerns. The Port's overarching WHMP objective for the Primary Zone is to eliminate or reduce to the extent practicable all attractants for wildlife species of concern that occur there, and to not allow any new attractants to be located within this zone. The WHMP risk evaluation analysis further defines the need for and the priority of management actions taken in this zone. Potential wildlife hazards within the Primary Zone are currently monitored daily

from dawn to dusk and wildlife control procedures are employed as necessary to disperse or remove wildlife species of concern. Most lands in the Primary Zone are under Port ownership and management.

4.2.2. Intermediate Zone

The Intermediate Zone (Figure 7), as the name implies, is the zone between the primary and secondary zones. The boundaries of this zone are based on the regulated surfaces and property ownership. It includes the Port owned airport land outside of the Primary Zone and, the additional land that falls under the approach or transitional surfaces of the runways. The approach and transitional surfaces are defined by the Title 14 CFR, Part 77 Imaginary Surfaces. This zone includes all Port owned airport land outside of the primary zone; therefore, if the airport acquires new property then this zone will expand to include the acquired property.

This zone was not in earlier versions of the PDX WHMP; it was developed during the 2009 update. This zone was developed to identify the areas outside of the Primary Zone where wildlife management is critical for aviation safety. The original Secondary Zone was so large that managing the entire zone for wildlife hazards was not feasible. It was determined that the Secondary Zone shown in the 2004 WHMP be split into two zones based on risk. Wildlife attractants closer to the airport have more risk of causing a bird strike than a wildlife attractant on the outer edge of the Secondary Zone. The management expectations for the Intermediate Zone are different from the Secondary Zone and are described in this plan.

Land uses within the Intermediate Zone should be compatible with safe aircraft operations, should not create new attractants for wildlife species of concern, and should not enhance existing attractants such that they become an unacceptable wildlife hazard risk. Land use in this zone, although primarily under airport ownership, is not dedicated to aviation but is managed to be compatible with aviation. Much of this property was acquired by the Port to ensure that activities around the airport are compatible with the needs and requirements of airport operations and to allow for future airport development needs. These Port owned properties are subject to the Grant Assurances provisions that apply to the Primary Zone (reference section 2.1.1) Most of the land on the east end of the Intermediate Zone is developed and contains airport parking and retail stores and other commercial businesses whereas the land on the west end is primarily undeveloped. Besides the land owned by the Port the Columbia River makes up the next largest area in this zone which cannot be managed for wildlife.

Land use proposals in the Intermediate Zone are screened by Port staff utilizing the risk evaluation process to ensure compatibility with aviation public safety. Appropriate actions will be taken on Port-owned lands to reduce unacceptable risks to aviation safety prior to the implementation of any major management decision. Whenever proposed actions on non-Port lands are assessed as a potential risk to aviation safety, the Port will work with, local planning and zoning authorities, adjacent landowners and the regulatory agencies to discourage or modify these actions. However, the Port recognizes it has no authority (either legal or fiscal) to directly implement management actions on non-Port properties.

4.2.3. Secondary Zone

The Secondary Zone (Figure 8) encompasses all remaining lands within the 10,000- foot separation criteria area established in FAA Advisory Circular 150-5200-33 that are not included in the Primary or Intermediate Zones. It is the largest spatial area of the three zones. Most lands in the Secondary Zone are privately owned and are not under direct Port management. Land uses within the Secondary Zone should be compatible with safe aircraft operations, should not create significant new attractants for wildlife species of concern, and should not enhance existing attractants such that they become an unacceptable wildlife hazard risk.

Like in the Intermediate Zone, land use proposals in the Secondary Zone are screened by Port staff utilizing the risk evaluation process to ensure compatibility with aviation public safety. Appropriate actions will be taken on Port-owned lands to reduce unacceptable risks to aviation safety prior to the implementation of any major management decision. Whenever proposed actions on non-Port lands in the Secondary Zone are assessed as a potential risk to aviation safety, the Port will work with local planning and zoning authorities, adjacent landowners and the regulatory agencies to discourage or modify these actions. However, the Port recognizes it has no authority (either legal or fiscal) to directly implement management actions on non-Port properties.

Figure 6. Primary Zone around PDX

Figure 7. Intermediate Zone around PDX

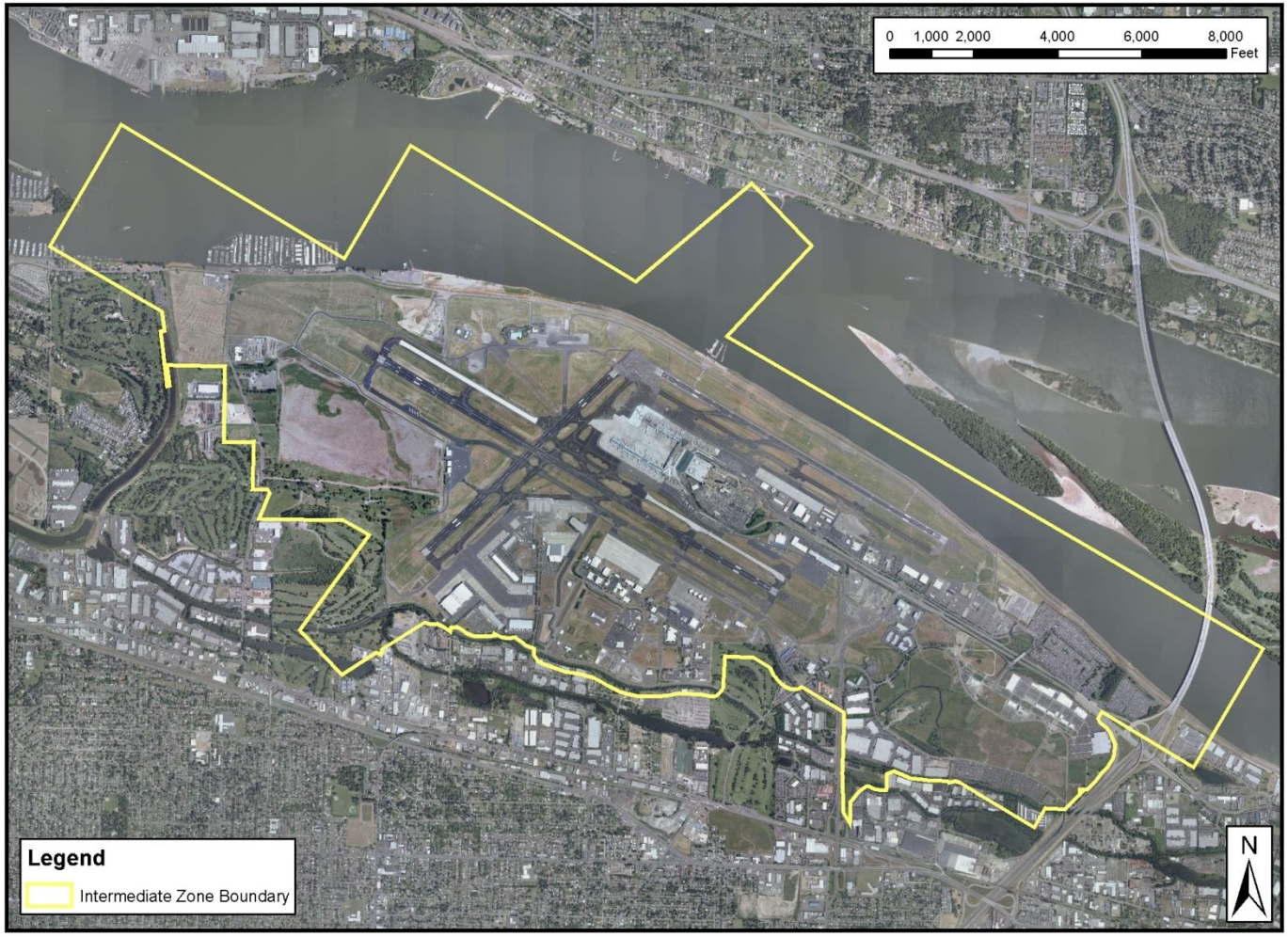
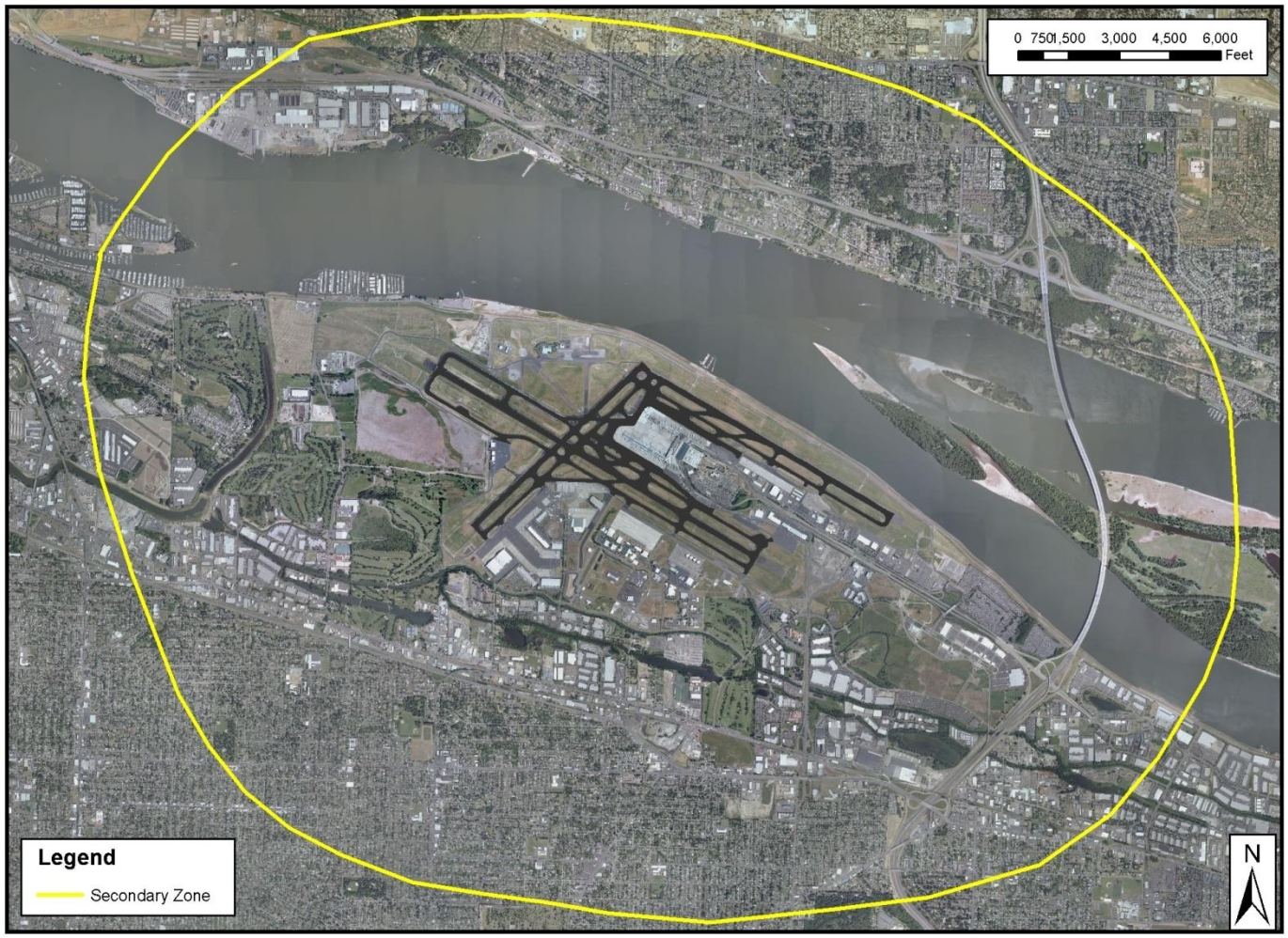


Figure 8. Secondary Zone around PDX



4.3. Management Area Strategies

In order to document and organize all of the management concerns, constraints, and actions, PDX was divided into logical areas based on land-use, wildlife management and habitat type. As a result, 12 large areas of land (management areas) were delineated (figure 9). Management areas outside the airfield fence (areas B-L) are managed under the Undeveloped Properties management program which implements the risk management strategies developed in the WHMP:

A. Airfield

B. East End of Runway 28R

C. Airport Way

D. East of Runway 28L, Portland International Center

E. Military

F. South of Runway 3/21

G. SW Quad/Elrod Road

H. West of NE 33rd Avenue

I. NW Airfield

J. Government Island

K. Fazio

L. Marine Drive

This approach categorizes wildlife hazards and explains the operational strategies for each area in a comprehensive spatial context for all Port-administered properties in the Primary, Intermediate and Secondary Zones. It also facilitates the development of management scenarios. The effort utilizes the best information currently available, based on wildlife observations and strike data at PDX. These management areas are subject to ongoing assessment and revision.

The Management Areas Tracking table (Appendix F) also identifies the principal wildlife habitats present in each management area, expected utilization by wildlife species of concern, other management constraints and issues associate with the management areas, and management actions taken to date in these areas.

Within each management area, the risk management techniques and protocols discussed in Chapter 5 have been integrated into specific management strategies that address the wildlife hazards unique to each management area. These management

strategies are organized according to four management components or "pillars" that support the Wildlife Hazard Management program: (1) short-term operational strategies, (2) research and development projects, (3) long-term management strategies, and (4) information and educational programs. These program components are interconnected by lateral paths representing information and technology transfer. A brief description of these 4 program components or pillars follows.

The first pillar, short-term operational strategies, deals with the need of the moment. This includes the reactive, dedicated dawn-to-dusk hazing and harassment program intended to clear the airspace of wildlife species of concern for an immediate aircraft operation. In addition, short-term habitat manipulations on a relatively small scale are included in this operational category. Examples include tree topping and pruning, netting projects, rodent baiting, mowing schedules, and perching deterrents.

PDX has set a management objective to achieve this first pillar, when possible, in a non-lethal manner, utilizing the full range of technologies available. However, implicit in this statement is the recognition that it may not always be possible to avoid lethal control. The 2009 WHMP identifies the decision-making process necessary for consideration of lethal action (See Section 5.1.7), which is based on the level of threat to public safety. A basic premise of the lethal action strategy is that it will target an individual animal and its problematic behavior, rather than targeting a population. The only current exceptions to this rule are the European starling control program, and the prey base control strategies for the grey-tailed vole. The European starling is an introduced pest that not only presents a significant hazard to aviation (due primarily to its flocking behavior), but also represents an ecological risk as they threaten native species diversity. Grey-tailed voles are found in abundance in the artificially created and maintained short grass environment of the airfield, and are the primary food source for red-tailed hawks and other predatory species of concern at PDX such as great blue herons, barn owls and great horned owls. Based on actual strike records and other factors such as soaring/hunting behavior and size of bird, the red-tailed hawk is currently the number one wildlife species of concern at PDX. Short of actual site conversion of the grass cover of the airfield, the development of an effective prey base control strategy is essential in order to reduce the attractiveness of the airfield to red-tailed hawks.

The second pillar is ongoing applied research and development to expand the range of available wildlife control options, test new hypotheses and evaluate new technologies. It is important to the Port that the results of its applied research efforts be discussed and shared with the larger, professional community. Wildlife hazard management deals with the behavior of dynamic, living organisms that have a demonstrated capability to adapt to the human environment. This requires a level of program flexibility and a commitment to the principles of adaptive management for the program is to be effective over time. The information gained from research and development projects transfers into both the short-term operational strategies and the long-term management strategies.

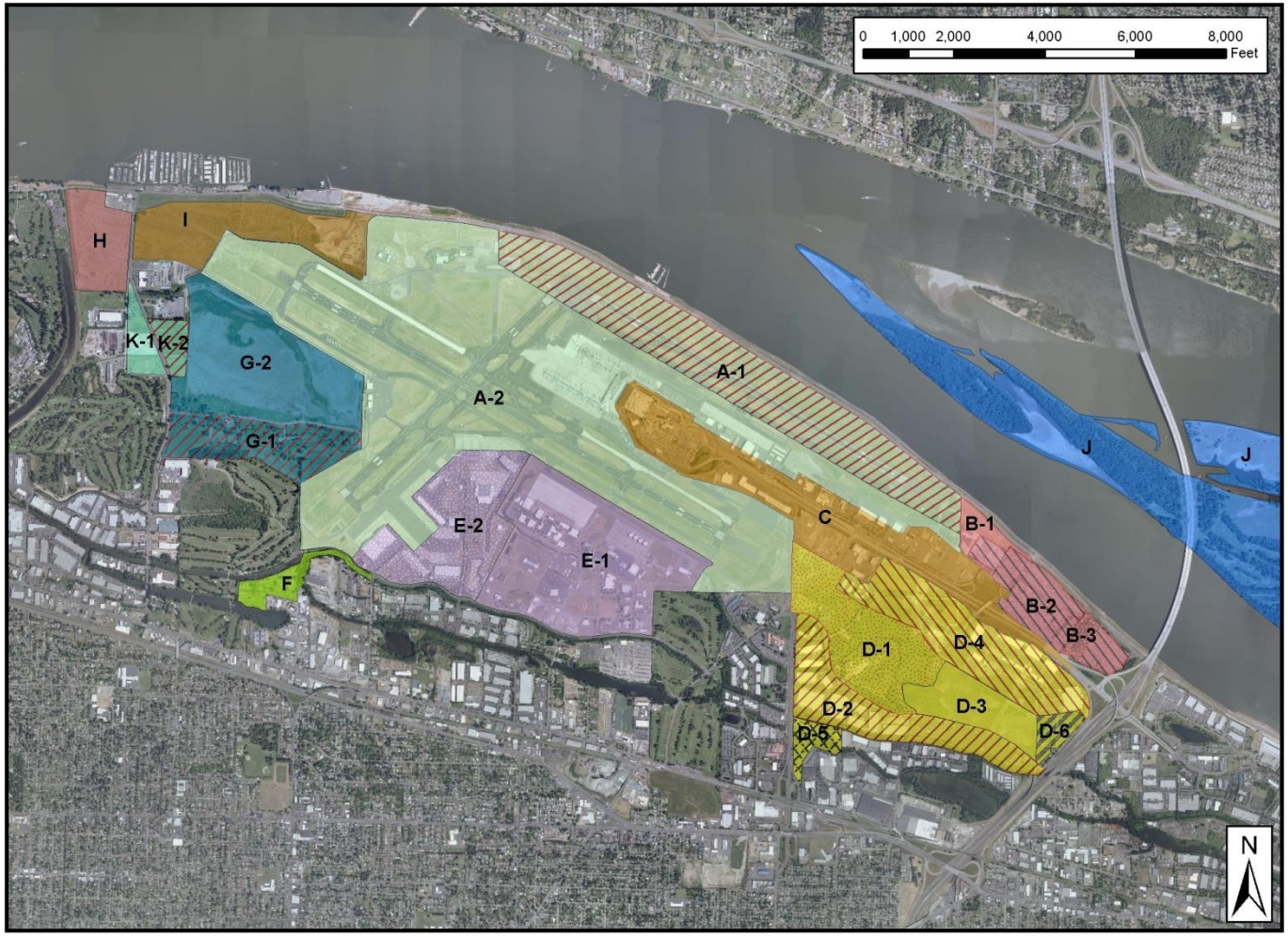
The third program pillar is the development of long-term management strategies, including habitat modifications and permanent site conversion. These strategies are based on the premise that both the physical presence of wildlife species of concern on the airfield, and the length of time that they are present can be diminished by reducing the attractiveness of the habitat on and around the airport. However, in highly modified

environments like airports, single-focused habitat alterations to discourage one species of concern often can create enhanced conditions for another species of concern. Therefore, effective long-term habitat modifications must be designed to consider changes to the whole ecological system. Long-term management strategies may range from physically excluding the species permanently from the area (where possible), to habitat modifications, like tree or wetland removal.

The fourth pillar of the program is the information and education component, which recognizes that wildlife issues are of widespread interest to both internal and external groups and individuals. The success of the program is predicated on active cooperation with a large number of stakeholders, and an ongoing program to inform and elevate awareness of wildlife issues at PDX. Providing outreach opportunities also provides input that helps to tie PDX issues into its larger regional context.

Appendix F contains a table which provides a summary of management strategies proposed for PDX. The information in Appendix F is based on the ongoing and completed management actions outlined in Table 3 of the 2004 WHMP, as well as potential management actions that may be pursued in the future. The management strategies are organized by management area, and categorized into one or more of the four pillars described above. In addition, identified management strategies are also tied to their location within the Primary, Intermediate or Secondary Zones at PDX. As described in Chapter 4, the management of wildlife species of concern and wildlife attractants is driven, in part, by their location in these areas, which together define the 10,000 foot separation criteria area at PDX. This tiered approach to wildlife hazard management is based on the assumption that the potential risk posed by a wildlife hazard increases with proximity to aircraft operations. A more complete discussion of the Primary, Intermediate and Secondary Zones, and which management strategies apply to each, are described in Sections 4.2.1 - 4.2.3 that follow Appendix F. As mentioned previously, all management strategies identified in Appendix F, as well as the need for the zone approach, are reassessed and validated on an ongoing basis.

Figure 9. Location of wildlife management areas around PDX



4.4. General Operational Strategies

All of the components described in the previous sections interact on a daily basis to resolve both immediate and long-term hazardous wildlife issues at PDX. When a potentially hazardous situation is encountered, the first action is usually a reactive hazing component (except for species that cannot be effectively hazed, such as deer). The least aggressive tools are tried first, such as auditory and pyrotechnic harassment, and are repeated to see if the wildlife species of concern can be effectively hazed from the critical area. If the situation is not resolved by the use of these methods alone, Wildlife staff will use more aggressive options such as paintball markers to make the animal physically uncomfortable.

Wildlife staff will also consider whether an activity is occurring that may be attracting a wildlife species of concern to an area, such as mowing, watering, construction, or hydro seeding. Although these activities cannot always be stopped, they can often be modified or completed at a time of day when the species of wildlife in question is less active. Many times, an awareness of the situation, and a stepped up hazing program to respond to the situation, if it is temporary, is enough to resolve the issue.

If these measures are ineffective, the next step is to evaluate whether the wildlife species of concern can be excluded from the area. Various exclusion devices such as netting, spiking or fencing, that will prevent access to or reduce the attractiveness of an area to the species of concern will be assessed.

If none of the above options are effective or feasible, habitat modification will be considered to resolve the situation. Wildlife staff will evaluate the habitat being used by the wildlife in question and how it is being used. If a modification can be made to make the area less attractive to the wildlife species of concern, this will be considered. Staff must be cautious that a habitat modification does not inadvertently attract other wildlife species of concern. Consideration must be taken for permits that may be required for some types of habitat modification, such as tree removal or wetland impacts.

If there is not a habitat modification that is feasible, Wildlife staff will consider whether the wildlife species in question can be trapped for relocation. Coordination with the appropriate regulatory agencies is required in these cases.

The “research and development” pillar as well as the “information and education” pillar (Section 4.3) also come into play at this stage. Wildlife staff will contact other airports to see how they may have resolved a similar situation. Often, the FAA has experience advising airports about wildlife situations and can provide contacts that have experience with the problem species. Researchers, such as the USDA National Wildlife Research Center or universities, will be contacted for ideas. Vendors of wildlife control equipment can be a good source for new equipment that might be used in specific situations. Other industries that deal with wildlife control can provide ideas about methods or equipment that can mitigate a specific situation.

When new technologies become available, they will be implemented on a trial basis, be monitored, and evaluated to determine if it is a potential solution. As new methods or

materials are found to be effective, they will be integrated into the daily operation of the Wildlife Hazard Management program at PDX.

If all non-lethal methods have been considered and are not effective or feasible, a lethal action may be considered. An evaluation will be conducted on how the lethal control would be implemented, who would do it, and what the determination would be to start and stop the lethal control. More detail on lethal control is presented in section 5.1.7.

As the above discussion demonstrates, each of the four pillars works in context with one another: 1) Short-term Wildlife Control Procedures; 2) Long-term Habitat Modification; 3) Research and Development; and 4) Information and Education. Information gained from applying each of the four aspects to a specific wildlife hazard situation is transferred to the other components. The principles of adaptive management are used to try various options until an acceptable one is found. The result is the generation of experience and data on the range of effectiveness of the options available in dealing with a specific wildlife situation, using the best science and technology available.

4.5. Project Evaluation

For consistency and to prevent potential conflicts of use and/or safety issues, the following decision making processes have been developed for activities within 10,000 feet of PDX. They outline the general decision making process for each of the following situations: requesting general technical assistance, coordinating activities and implementing actions on Port lands that may affect one or more Port operating areas, and implementing habitat modifications on Aviation lands. All of the processes were developed as part of the Port's ongoing management program and were designed to ensure all parties are aware of potential conflicts in use.

4.5.1. Project Screening for Proposed Development

Activities and/or projects on Port lands within the 10,000-foot separation criteria of the PDX runways have the potential to adversely affect safe airport operations. Consequently, a decision making process was developed to assist in coordinating efforts for projects within the 10,000-foot area. For Port projects, the project managers should refer early conceptual project design to the Wildlife Manager to identify and avoid actions that may have the potential to adversely affect safe airport operations in accordance with FAA guidelines. This may include, but is not limited to:

- Building location and design;
- Landscape design;
- Stormwater Management;
- Mitigation projects and general enhancement of natural areas;
- Tenant or leasehold improvements.

In addition, the Port's BATS procedure was developed to provide early conceptual screening for a wide range of potential impacts of proposed tenant projects. The wildlife program utilizes the BATS process to screen project proposals for potential wildlife hazard attractant features and recommendations are made as appropriate to the planning team.

Military tenants of the Port should, when designing projects and activities within a 10,000-foot radius of the PDX runways, consult with the Aviation Wildlife Manager to identify and avoid actions that may have the potential to adversely affect safe airport operations in accordance with FAA guidelines.

Once the Aviation Wildlife Manager is made aware of a project, the initial step is to determine whether the project may pose a hazard. If it is determined that the project would not pose a potential hazard, the project would move forward. If a potential hazard were identified, the project would undergo the risk evaluation to determine if the risk due to the project is acceptable or if project modifications could be incorporated to lower the risk to an acceptable level.

Mitigation sites within 10,000 feet (Buffalo Street, Elrod Road, and Alderwood) are managed by the Port's Marine and Industrial Development mitigation (MID) management program. MID staff works with the wildlife program to ensure that the management of the mitigation sites is compatible with the WHMP.

For projects that are not on Port land within 10,000 feet, wildlife staff work cooperatively with local planning and zoning staff to screen projects for potential wildlife hazards, primarily stormwater management and landscaping.

4.5.2. Monitoring and Evaluations

The Port developed an integrated Environmental Management System (EMS) in 2000, compliant with ISO 14001 guidelines and based on the principles of adaptive management. The PDX Wildlife Hazard Management program is designed within this context, integrating scientific methodology with the built in adaptive management feedback loop of *Plan*; *Do*; *Check*; and *Act*. Adaptive Management has been defined as "a system of management practices based on clearly defined outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to re-evaluate the outcomes." (*Department of the Interior Manual, May 27, 2004 Environmental Quality Programs*).

The application of these principles at the operational and program levels provides the flexibility necessary to respond to changes in environmental conditions, adjust to unanticipated impacts, and modify management strategies to improve effectiveness. Given that the PDX Wildlife program is dealing with living organisms which are adaptive by nature, and the complexity of ecological inter-relationships involved, this flexibility is essential to the success of the program. The program has been developed to constantly monitor success and re-assess strategies informally on an ongoing basis, and to formally assess overall program effectiveness on an annual basis culminating in an annual accomplishment report filed with the FAA.

5 RISK MANAGEMENT TECHNIQUES AND PROTOCOLS [14 CFR 139.337 (4) & (5ii,iii)]

The risk management techniques and protocols chapter of the WHMP outlines the measures employed to ensure public safety at PDX by reducing the incidence of wildlife-aircraft collisions. As described in chapter 4 these measures are grouped according to the 4 pillars:

1. Wildlife control procedures to discourage, disperse and remove wildlife species of concern from the airfield vicinity;

2. Research and development projects to gather data and field test new equipment and techniques, and to gain understanding of wildlife dynamics as they relate to PDX;

3. Habitat modification practices to reduce the attractiveness of features of the natural and built environments on and around the airport to wildlife species of concern; and

4. Information and education programs to articulate the hazards wildlife can pose to the safe operation of aircraft.

Wildlife control procedures and habitat management actions undertaken at PDX are subject to regular field-testing and evaluation by Wildlife staff. It is expected that these measures will change and be refined over time as more effective applications and new techniques are identified.

A detailed presentation of the various techniques, approaches and strategies currently utilized for wildlife hazard management follows.

5.1. Wildlife Control Procedures

Wildlife control procedures are utilized to immediately discourage, disperse and remove wildlife species of concern from high risk areas on the airfield. Their implementation encompasses the day-to-day, on-the-ground efforts routinely employed by Wildlife staff to ensure that the approach and departure airspace is as free of potential wildlife hazards for immediate aircraft operations as is practicable. Wildlife control operations

are generally reactive to the situation of the moment, responding to any perceived threat to aircraft safety posed by wildlife species of concern.

Wildlife hazards that develop on or around the airfield are assessed by Wildlife staff to determine the most applicable control option. A primary key to successful wildlife hazard management is persistence and innovation on the part of the individuals implementing the management strategies. Wildlife staff select the appropriate control techniques according to biological, sociologic, economic and political factors. Most common control techniques retain their effectiveness if they are used infrequently, and in conjunction with other methods. The control method(s) chosen will depend largely on the situation at hand and the species involved.

A variety of control equipment and resources are currently used to disperse wildlife attempting to utilize PDX for food, shelter or resting. The type of equipment used in any given situation will vary depending on the nature of the wildlife threat and the associated risk. The ultimate goal of all wildlife control equipment is to achieve the most efficient means of wildlife dispersal.

5.1.1. Personnel & Communications

Wildlife staff are on duty 7 days a week from dawn to dusk. They are responsible for conducting physical inspections of airfield movement areas, and other areas critical to wildlife hazard management. During periods of high wildlife activity, more than one Wildlife staff person may be assigned to the airfield. In addition, Airport Operations Supervisors conduct physical inspections and haze wildlife as needed in support of Wildlife staff.

5.1.2. Vehicles

In order to effectively reach all areas of the airfield, wildlife control vehicles are all-wheel drive capable with the ability to communicate, via radios, with other airport assets and with the Air Traffic Control Tower. In addition, each vehicle is equipped with air horns, sirens and spotlights. Vehicles used primarily for airfield patrols are also equipped with pyrotechnic scaring devices, such as a shell-launching pistol and/or a 12-gauge shotgun.

5.1.3. Wildlife Surveys

AIRMAN

Airport Information Report Manager (AIRMAN) is software designed by Winfield Solutions for the use of data collection in airport wildlife management. AIRMAN provides a database where wildlife data is compiled and organized for easy management queries. Queries can be displayed spatially on an aerial photograph to display any and all attributes recorded by Wildlife staff. Once the data is entered into AIRMAN, its logical organization allows general trend analysis that can be performed instantly. Annual and monthly reports are generated for review, enabling well-informed management decisions.

Data collection is conducted by PDX Wildlife staff trained in wildlife data collection and entry. The data is entered into a portable version of AIRMAN (AIRMAN Mobile). Data collection procedures and sampling assumptions are periodically reviewed with all designated observers to ensure uniformity with observations and data collection.

Data Collection Procedure

For each wildlife observation, the following information is electronically recorded on AIRMAN Mobile while in the field:

Date/time of occurrence. The time of day is recorded when the wildlife species is initially observed.

Weather. Throughout each shift Wildlife staff records the current weather conditions by tuning the 800 MHz radio frequency to Automatic Terminal Information Service (ATIS) at 128.35. Temperature, precipitation, cloud cover, wind speed and wind direction are monitored and recorded.

Grid location. The location of the species observed is recorded using a grid system that is overlaid onto an aerial photograph. When wildlife is observed moving over or through multiple grids, the first grid location is recorded (Figure 10).

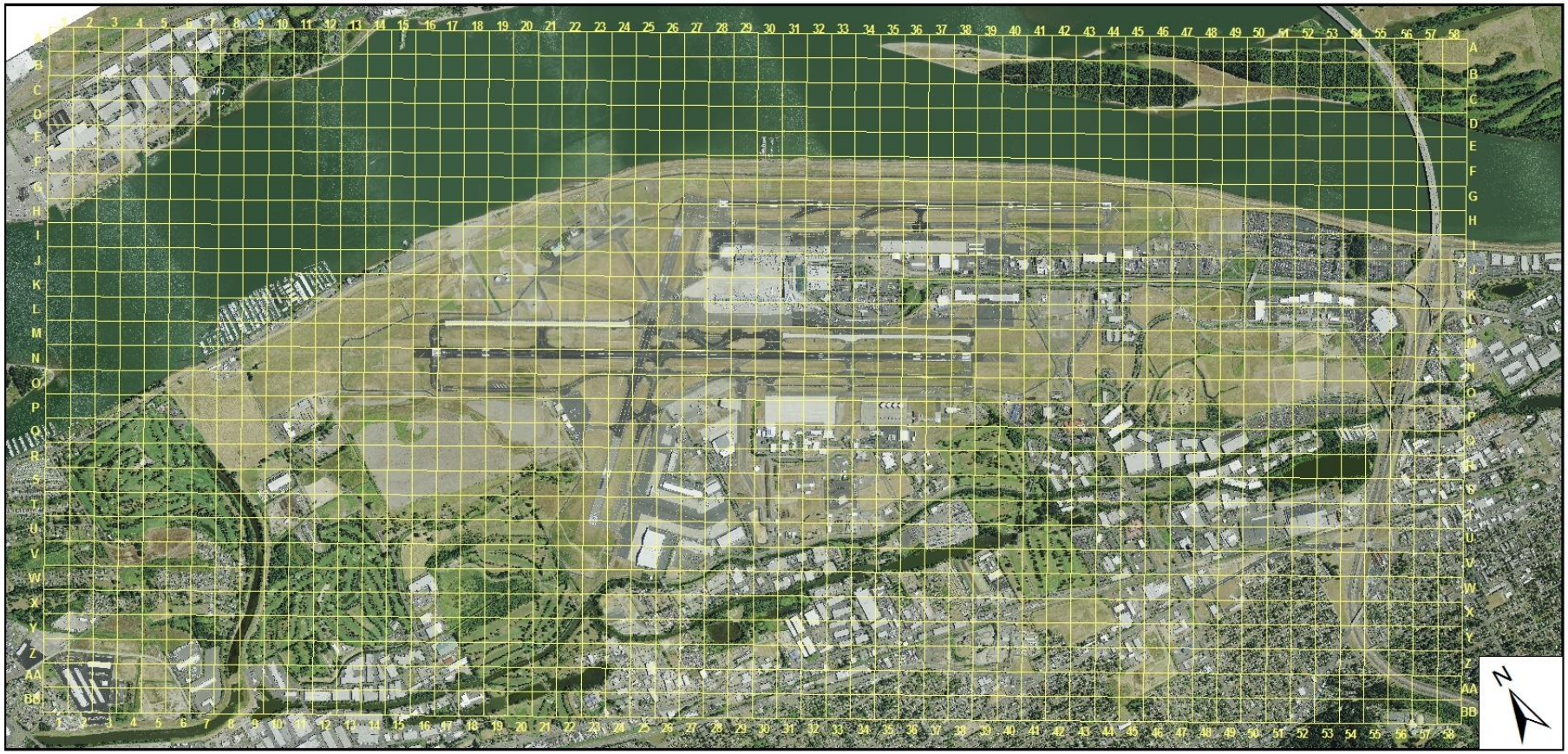
Species observed. The Wildlife staff records the species observed using the assigned four letter codes. More specific information is collected on raptors to identify individuals that are then classified as resident or nonresidents. Plumage variation and band numbers are the primary characteristics used to determine individual birds of the same species. Any species that is not positively identified will be recorded as "unknown". If a species is observed multiple times throughout the day in the same location and is exhibiting the same behavior, it is to be recorded as one observation. If a species is observed multiple times throughout the day in various locations, exhibiting different behavior, or if dispersal techniques are conducted, it is then recorded as an additional observation.

Number observed. The number of individuals is recorded for each species observed. When a particular species is exhibiting flocking behavior the total number of individuals in the flock is estimated.

Activity. The activity is intended to capture the behavior of the species when associated with the attractant. The initial activity of observed species is recorded. If there is a notable change in the species activity during the observation, additional information is recorded in the "notes" section of the datasheet.

Attractant. Assumptions are made by Wildlife staff regarding what the observed species is attracted to. These assumptions are based on the behavior of each individual species (e.g. feeding behavior, breeding behavior, resting/loafing behavior, territorial behavior).

Figure 10. PDX AIRMAN Grid Map



Dispersant. When hazing or dispersing wildlife from the airfield, the equipment or method used is recorded. If multiple dispersants are used, the two most aggressive dispersants are recorded.

Result. Wildlife staff record the outcome of their hazing attempt. If no dispersal action is taken it is then recorded as "observed".

Strike. If a species is involved in the aircraft strike, additional information is collected to complete a FAA strike report. The strike report is then sent to the FAA's regional office within 30 days. In the incidence of an aircraft strike, Wildlife staff document the following:

- Name of the airline, type of aircraft, and registration number
- Date & time
- Flight number (when applicable)
- Phase of flight
- Runway Used
- Part(s) of aircraft struck
- Damage or no damage
- Effect on flight
- Species, number and size category of the species struck
-

Avian Point Count Surveys

Point count surveys for birds have been conducted bimonthly at PDX from 2000 to 2008. In 2008 the frequency of the surveys has been increased to weekly. All of the point count surveys are conducted by MHCC Co-op students under the direction of the Wildlife Manager. The Port's modified point count survey protocol (Appendix G) is designed to sample the entire avian population within the fenced airfield perimeter. This information is separate from the Wildlife staff intervention data.

5.1.4. Hazing and Harassment

Hazing and harassment are the primary means used to clear wildlife species of concern from the airfield to allow for safe aircraft operations. This is responsive to the immediate safety needs of each arriving and departing aircraft. It is a dedicated dawn to dusk operation tied to air traffic patterns and wildlife activity levels at PDX. Techniques currently used to haze birds include pyrotechnic devices (e.g., shell launching pistols, 12-gauge shotguns), remote controlled propane cannons, other auditory frightening

devices (e.g., vehicle air horns and sirens), visual deterrents (e.g., green laser), and paintball markers. Reactions to hazing/harassment are noted and wildlife are monitored to ensure that they do not relocate onto another AOA. In these situations, two personnel may be required to ensure the species of concern leaves the AOA without additional hazing. The results of each dispersal action taken (e.g., species hazed, technique employed, consequence) are entered into the AIRMAN database for future retrieval and evaluation. Before implementing any hazing techniques wildlife staff will assess the location of wildlife relative to imminent aircraft operations and will determine the appropriate method and timing for hazing.

Based on the findings of the ongoing risk analysis and the results of research and development trials of new technologies here at PDX and elsewhere in the airport community, techniques and protocols followed for hazing and harassment may evolve to better reflect new information. In the interim, the Port's methodology is as follows.

Pyrotechnic Devices

PDX currently utilizes two types of hand held pyrotechnic devices, shell launching pistols and 12-gauge shotguns, to control wildlife on the airfield.

Shell Launching Pistols

This lightweight and convenient device fires a 15mm cartridge (a Bird Banger or Screamer Siren) approximately 50 to 275 feet respectively while making a whistling noise or loud bang. The pistol gives the operator in the field the flexibility of localized bird control in a simple and timely manner. Before discharge, the user will evaluate the location of the birds to be hazed to determine if there is a potential for foreign object or debris (FOD) from the shell casing to enter the movement areas. Under no circumstances will FOD be allowed to land on the movement areas. These pistols and shells will be carried in all wildlife control vehicles.

12-Gauge Shotguns

The shotgun is an excellent tool for wildlife dispersals. Its primary purpose is to fire shellcrackers, which are 12-gauge shotgun shells that propel a large firecracker approximately 375 feet, before it explodes with a loud report. An added advantage of shellcrackers is that they do not generate FOD.

Remote Controlled Propane Cannons

Remote-controlled, propane-powered sound cannons are installed at PDX in those areas that typically attract large concentrations of wildlife, and in places that are difficult to access by vehicle. These cannons fire only when Wildlife staff electronically signal the units to operate. The ability to fire individual cannons only when birds are near, as opposed to cannons that fire constantly, reduces the incidence of habituation to the sound cannon system and increases its effectiveness.

Other Auditory Frightening Devices

Many times, wildlife can be dispersed from an area using the air horn and siren installed in wildlife vehicles. By positioning the vehicle between the aircraft and the wildlife of concern, wildlife will often move away from the vehicle where the sound is coming from, and therefore, away from the aircraft. This is a quick way to disperse wildlife while in a moving vehicle, without having to use a pyrotechnic device. Using sirens and horns is also appropriate in situations where FOD is a concern (on a runway or taxiway) or where cracker shell noise may be an issue (on the ORANG base).

Visual Deterrents

Green laser

The laser is primarily used to disperse birds that do not react to other hazing methods or when there is a need to disperse outside of the range of pyrotechnics and cannons. Birds perceive the laser as a solid threatening object and tend to disperse when the laser beam is detected. The laser is a handheld unit which is activated from the PDX Wildlife control vehicle. Wildlife staff follows approved FAA protocols when utilizing the laser inside the aircraft operating area. When Wildlife staff identify the need to use the laser they will take precautions similar to those taken when implementing pyrotechnic dispersals. The laser must be pointed at the ground and/or other non-reflective surfaces such as dry pavement to terminate the beam. The PDX tower will be notified when laser operation are in use in accordance with established protocols. The laser is most effective in low light conditions.

Silt Fencing

Silt fencing is used on undeveloped properties outside the airfield fence, primarily as a goose deterrent. The fencing acts as a visual barrier that introduces the uncertainty of potential predators by obstructing the view. Being unable to see potential predators gives geese an unsettling feeling which has proven to be extremely effective in deterring geese in large open areas.

Physical Harassment Devices

PDX currently uses two types of physical harassment devices to control wildlife on the airfield, paintball markers and bean bags. The primary choice of the two is the paintball marker as it has less potential for physical injury.

Paintball Markers

The paintball marker was purchased for the explicit purpose of hazing and marking wildlife at PDX. Only Aviation Wildlife staff trained in its use will be allowed to use it, and it will only be used for the purpose of hazing and marking wildlife. A protocol for the use of paintball markers to deter wildlife at PDX is as follows.

1. Only temporary water soluble paint balls (both colored and clear) are used at PDX for the purpose of marking or hazing birds, and are therefore not subject to

the permit requirements of the USDI Bird Banding Laboratory. Permanent paint balls are utilized for the marking of mammals for the purpose of documenting individual behavior.

2. Before a paintball is discharged, the user will evaluate the location to determine if there is a potential for FOD from the paintball casing, or for paint marking a runway or taxiway sign or pavement area. No FOD from paintballs will be allowed to land on movement areas. No paintballs with colored paint will be shot toward movement area markings or signage; only clear paint balls will be used under these circumstances.

3. The user of the paintball marker will consider the distance and species of bird before firing. An appropriate distance and psi will be used to minimize the potential of injuries to birds. The user will attempt to hit the bird in the keel or high on the shoulder. Every attempt will be made to avoid hitting birds in delicate areas. All birds tagged with the marker will be observed as they fly away to assure that they have not been harmed. Any bird that appears to be injured will be captured for treatment at the Audubon Society's Wildlife Care Center.

4. No paintballs will be fired toward or over public roadways or toward people on or off the airfield.

5. The paintball marker will be used to discourage wildlife from using the airfield only after other dispersal techniques (vehicle, siren, horn, cannons, pyrotechnics) have proven ineffective. Appropriate situations include:

    a. Marking a coyote that has been on the airfield to see if it returns. The coyote should be marked, if possible, during the process of herding it off the airfield.

    b. Marking and hazing great blue herons and red-tailed hawks that have grown accustomed to pyrotechnics and will not leave the area.

    c. Marking and hazing flocks of geese that use quiescent ponds or other adjacent airfield properties to determine if they are residents or migrants.

    d. Paintballs are used as a negative reinforcement when birds have habitualized to pyrotechnics. Paintballs are used in conjunction with pyrotechnics to instill the fear of pyrotechnics.

Bean Bags

In the event that a coyote refuses to leave the PDX airfield via an open gate and continues to be a hazard to an AOA, a bean bag may be used as a non-lethal dispersant to haze the coyote. The purpose of the bean bag shell is to give the coyote a negative association with the airfield. The bean bag consists of a 2 inch square heavy cloth bag filled with lead pellets contained in a 12-gauge shotgun shell.

Protocol for Hazing Birds

Wildlife species of concern exhibiting high risk behavior to aviation safety on or near a runway, taxiway, or ramp will be hazed away from the aircraft operating area (AOA). Before conducting hazing activities, the Wildlife staff will consider:

1. The most effective method and tools for hazing the species under consideration.

2. How to move the bird away from the AOA. If possible, the person will position the vehicle between the animal/bird and the runway or taxiway to push it from a high risk area to a low risk area.

3. Consideration will be taken to avoid shooting pyrotechnics toward aircraft, people, buildings, vehicles, the fuel farm, the military base, etc. Cannons should only be fired when they can be seen to ensure no one is in the immediate vicinity when it is fired.

4. The airfield environmental conditions. In wet conditions, some areas are not accessible with a vehicle. Long periods of dry weather increase the chances of grass fires when pyrotechnics hit the surface.

5. Aircraft in the area and the direction of air traffic. Unless a bird/animal is on the runway and needs to be moved prior to a departure or landing, the dispersal will wait until there is not heavy aircraft movement in the area. Wildlife staff will monitor the tower radio and keep a visual on air traffic to avoid moving wildlife species of concern into the path of landing or departing aircraft.

6. Non-FOD generating techniques are the preferred hazing method of use in the AOA.

7. Wildlife staff will often coordinate hazing actions with Airfield-1 to allow for more effective hazing using multiple vehicles, and whenever runway access is required.

Wildlife staff must determine the safest, most effective way to implement pyrotechnic control of wildlife species of concern. Reactions by birds to pyrotechnics vary by species, time of year, and numbers present. Generally, the best technique to disperse birds is to get positioned upwind between the bird(s) and the active runway(s) (birds normally take off into the wind, turn, and then fly off with the wind when being harassed). Wildlife staff should aim away from the runway, if possible, and shoot the noise generating shell-cracker about 45 degrees away from the target, on the opposite side of the desired escape route.

In some situations, birds may only circle and move to another part of the airfield, or return to the same spot. In such cases, it is advantageous to have two wildlife personnel using control measures to prevent birds from just relocating or returning. In addition, use of propane sound cannons in conjunction with the shell-crackers can effectively prevent birds from returning to another site on the airfield.

All debris from pyrotechnics should be retrieved whenever possible, especially on taxiways and runways where they become a FOD concern.

Protocol for Management of Mammals at PDX

No standard protocol is followed to disperse or remove mammals from the aircraft operating area at PDX because of the varying response to hazing demonstrated by different species of mammals. Instead, species-specific procedures are followed that have proven effective over time at PDX. For the purpose of this program, feral dogs, feral cats and other formerly domestic animals will be considered wildlife. Domestic animals that are accidentally released on the airfield will not be classified as wildlife. Every attempt will be made to capture domestic animals and return them to their owners. Based on the findings of the ongoing risk analysis, Port protocols for addressing these issues may evolve to better reflect new information. In the interim, the Port's operating assumptions are as follows:

Feral Cats

Feral cats have been present at PDX as long as records on wildlife activity have been kept. There is no record of a cat ever being struck by aircraft at PDX.

Management actions are not currently being taken to reduce the number of feral cats at PDX. Since there are many species of concern at PDX that do pose a significant threat to aircraft, Wildlife staff have been directed to focus their efforts on those species. However, as with any other species of wildlife on the airfield, if a specific feral cat exhibits repeated behavior that puts it in direct conflict with aircraft, that specific individual may be removed by any appropriate means necessary, including lethal means.

Trapping feral cats for adoption is not a part of the PDX Wildlife Hazard Management program, since there are higher priority species to be managed that pose a direct hazard to aircraft. However if feral cats are trapped at PDX they will not be released back onto the airfield.

As with all species of wildlife currently observed at PDX, but not currently managed for, feral cats will be monitored to determine if their numbers or behavior bring them into conflict with airfield operations. If this determination is made, the Wildlife Manager will determine the appropriate response to this concern and convey a management plan to Wildlife staff and Airfield staff.

Coyotes

When dispersing coyotes from the airfield, the acceptable procedure is to open a perimeter gate and direct the coyote out of the gate with vehicles. This may require enlisting assistance from additional wildlife staff and other airfield staff, such as Airport Operations, Port Police, Port Fire Department, or Port Maintenance. Our experience is that aggression towards a coyote makes them skittish and less willing to be hazed off the airfield. Anticipating the direction they are going in, and providing them an avenue of exit proves to be an effective technique. Wildlife staff will coordinate with Airfield-1 if the

coyote is on the runway, or if access to a movement area is needed to disperse the coyote away from aircraft activity. In the event that a coyote refuses to leave the airfield via an open gate and continues to be a hazard to an AOA, paintball markers or bean bags may be employed. In extreme cases where the animal will not respond to all other means and continues to disrupt airfield operations and present an ongoing threat to safe aircraft operations, lethal direct action may be authorized (refer to section 5.1.7),

Deer

Deer rarely find their way past the security fence and onto the airfield at PDX, and do not need to be dispersed if they are outside the airfield security fence. If there is a need to move deer from within the security fence, Wildlife staff will assess the situation and available options. Lethal action most likely will be employed since deer pose a significant threat to aviation safety throughout the nation and is considered an unacceptable risk. Deer cannot be dispersed with a vehicle or pyrotechnics as they will panic and will harm themselves or others.

Deer dispersal outside the security fence is under the jurisdiction of the ODFW. Port police will provide traffic control if deer impact a public roadway within their area of jurisdiction. In this situation, Wildlife staff will provide assistance to ODFW as requested.

Raccoons

Raccoons are occasionally seen at PDX, and will be dispersed away from movement areas. Problem raccoons maybe trapped and euthanized. If there are problems with raccoons off of the airfield the appropriate agency will be contacted to handle the situation.

Beaver and Nutria

Occasionally beaver and/or nutria either find their way onto the airfield or cause damage to Port property in areas outside the airfield. The airfield and surrounding Port properties, along with their associated water features, fall completely within the management boundary of Multnomah County Drainage District (MCDD) #1. MCDD manages many of the water features surrounding the airfield for flood control purposes. In order to protect their infrastructure from beaver and nutria damage they hold a Wildlife Sighting and Damage permit, as well as a fur bearers permit, with ODFW for lethal control of beaver and nutria within their management area. All beaver and nutria related issues surrounding the airfield are thus delegated to MCDD for management action appropriate to their mission.

Dogs

Dogs out of the control of their owners or handlers on the airfield can be a hazard to aircraft at PDX. There have been numerous occasions when stray dogs, or escapees from airline carriers, have run loose across the airfield before they could be caught. If the dog can be easily handled, they should be put in a portable kennel. If they cannot, Wildlife staff will call Multnomah County Animal Control for assistance in capturing a vicious or unfriendly dog. Dogs whose owners are located will be returned to their

owners; stray dogs will be turned over to Multnomah County Animal Control. Airlines are encouraged to check the integrity of portable kennels used to transport dogs.

Small Mammals

Moles and other small mammals can damage airport facilities by chewing electric cables that power runway lights and by undercutting taxiway shoulders through their burrowing habits. These consequences represent indirect hazards to the safe operation of aircraft at PDX. Moles will be removed by direct control measures (e.g., trapping) whenever they become problematic on a portion of the airfield. In addition voles represent a primary food source that attracts raptors and other predators to the airfield.

Protocol for Airfield Access and Communications [14 CFR 139.337 (5iv)]

The following protocol outlines the procedures to be followed by Wildlife staff when accessing the PDX airfield and maintaining communications to implement wildlife management operations. The procedures are intended to satisfy the requirements set forth by the FAA and PDX Airport Operations for access onto the airfield and movement areas by Wildlife staff. Any deviation from the procedures outlined below must be approved by the Airport Operations Manager.

Communication procedures:

Any access to the airfield for the purpose of wildlife management will be coordinated with the Airport Operations Supervisor on duty (AF1).

1. Wildlife staff will notify AF1 prior to entering the airfield at the beginning of their shift and at the end of their day when they are no longer available**. Wildlife staff will be available by radio and cell phone at all times when on-duty.**

2. Wildlife staff shall maintain radio communication with AF1 at all times when performing wildlife management duties on or off the airfield. Radio communication with AF1 will take place on AV Ops using established radio call signs.

3. Wildlife staff will utilize tunable VHF radios (hand-held or vehicle) and maintain radio contact with FAA Air Traffic Control (ATC) at all times when working on or adjacent to a movement area. Unless an alternate discrete frequency is specifically assigned by air traffic, communication with ATC will take place on the frequency designated by the Automated Terminal Information Service (ATIS) information.

Accessing a movement area:

1. If access to a movement, safety or critical area is necessary to facilitate wildlife management activities, the Wildlife staff making the request shall contact AF1 to coordinate access to a specific area stating the purpose and estimated duration

of required access. Specific access and duration will be considered and approved by AF1 based on anticipated airfield impacts.

2. If access is approved by AF1, Wildlife staff will be given specific direction as to the geographical area(s) of access and instructed to contact ATC with the approved request.

3. Wildlife staff then contacts ATCT requesting access to the appropriate movement area.

4. Upon completion of the wildlife management operation, Wildlife staff will exit the movement, safety or critical area by the most direct and safe route advising ATC when clear of the movement area. Crossing a movement area and then parking outside the safety area will require clearance from ATC to cross back when leaving the area.

5. **No uncoordinated access to runways or runway safety areas is allowed**. If there is a specific wildlife issue that involves a runway or runway safety area, wildlife staff shall contact AF1 to advice of the situation and await direction from AF1. Operational options include:

    a. Escorted access on to the runway or into the safety area.

    b. Unescorted access into a safety area (on foot only if runway is open).

    c. A runway closure for access.

6. Vehicles will not be allowed to be parked on any movement area or in the safety area unless the area is closed.

7. Access to areas closed for construction or maintenance will require coordination with AF1.

Specific guidelines:

Port Wildlife staff may access movement, safety or critical areas in the course of wildlife management operations provided the following requirements are met:

1. Wildlife staff must have received specific training and have been certified by Airside Operations to implement this procedure. The Wildlife Manger shall provide Airside management with a current list of qualified wildlife personnel.

2. Access to movement, safety or critical areas shall be coordinated with AF-1 for the purpose of wildlife management only.

3. Wildlife staff and all associated equipment must be able to clear any area immediately when instructed by ATC or AF1.

Cooperation with the Oregon Air National Guard Base BASH Program

An operating instruction protocol has been developed for the hazing of wildlife within the perimeter of the Oregon Air National Guard (ORANG) Base by Port Wildlife staff. Compliance with this protocol, detailed in PDX Instruction 91-212, is mandatory. The Port Wildlife staff has the primary responsibility when implementing all aviation wildlife management techniques at PDX for the ORANG 142nd Fighter Wing as well as all commercial airlines and general aviation. In August 2008, the Wing's BASH plan was rewritten to supplement the PDX WHMP. The PDX Wildlife manager conducts reoccurring aviation wildlife management techniques training for the BASH team. Trained BASH team members are called upon when PDX Wildlife staff needs assistance. The 142nd Fighter Wing's 2008 BASH plan is presented in its entirety in Appendix H.

5.1.5. Raptor Trapping and Relocation

The trapping, banding and relocation of wildlife judged to pose a hazard to aircraft at PDX is currently practiced for raptors under permits issued by the ODFW and the U.S. Department of the Interior. Red-tailed hawks are the primary focus of this year around monitoring and management program. However, American kestrels, Cooper's hawks and other raptors are occasionally trapped and relocated. Raptor translocation is considered an ongoing management practice because of the attractiveness of the area to hawks. Trapping primarily occurs during the spring and fall migratory periods when an influx of non-resident migratory and transient raptors pass through the area. A brief summary of the raptor translocation protocol follows.

- Windshield surveys (surveys conducted from a vehicle) are conducted twice weekly throughout the year to assess raptor activity. Additional visits are made during critical or high use periods. Information on species, age, sex, location, identifying marks, and behavior is recorded. Nest location, chronology and success are monitored for resident red-tails nesting on lands adjacent to the airfield.

- Opportunistic trapping is completed as needed during the windshield surveys. All transient, migratory and young-of-the-year red-tailed hawks are targeted for capture and translocation. American kestrels are also targeted for trapping. Cooper's hawks and other raptors are usually caught incidentally.

- Raptors are captured with bal-chatri and goshawk traps baited with domestic mice, gerbils, house sparrows, starlings or pigeons. Starlings and pigeons fitted with noosed jackets are also used. The practice of "taming" red-tailed hawks by offering them free food (starlings) is used to encourage trap shy red-tails to respond to the offered lures.

- Captured raptors are removed from the trap and placed in a carrier for transport to an off-site holding area. Birds are measured, weighed and fitted with a uniquely numbered silver federal band on their right leg. Most red-tail hawks also receive an orange plastic band with a black alpha-

number or number-alpha code (PDX project band) on their left leg, and blue dye on the breast. The dye enables observers to spot birds that return even if the leg bands are not visible. Yellow plastic bands with a black number (USDA Airport band) may be used when PDX project bands are unavailable. Red-tailed hawks are usually held overnight in mid-sized airline-type dog kennels and offered food then transported and released within 72 hours. Other species (Cooper's hawk and American kestrel) are usually released the day of capture.

- Red-tailed hawk release sites are based upon presence of suitable habitat (open areas for hunting and adjacent forest with large trees for shelter and roosting); distance from PDX (average of 40 miles); and distance from other airports (more than 5 miles). Other factors influencing release site selection included presence/absence of territorial birds, proximity to busy roadways, human disturbance, prior success of the site, and number of red-tails recently released at the site. Cooper's hawks and American kestrels are released in areas with suitable habitat at least 5 miles from PDX or any other airport.

- Red-tailed hawks captured from January through May are primarily released at sites north of PDX in Columbia County, under the assumption that many of the birds are moving northward. Beginning in June and continuing through October, the primary release sites for red-tails are west of the Coast Range in Tillamook County, and in Wasco County near Tygh Valley. Other areas are used during periods of high activity to better disperse the released birds.

5.1.6. Avian Nest Intervention

Avian nest intervention techniques currently employed at PDX include Red-tailed hawk nest manipulation and waterfowl egg addling. The decision to intervene with active nests is dependent on location proximal to the airfield and species involved.

Red-tailed Hawk Nest Manipulation

Red-tailed hawk nest manipulation is intended to prevent nesting, disrupt eggs from hatching or removal of young chicks so that offspring don't fledge near the airfield and become imprinted to this area. The Port annually applies to the ODFW for authorization to conduct red-tailed hawk nest manipulation. These written authorizations allow the Port to manipulate specified nests located near the airfield. Each year, nests and methods of manipulation are specified in the ODFW permit. Nest manipulation methods may include egg addling, replacement of fertile eggs with infertile eggs, or trapping and relocation of chicks.

Waterfowl Egg Addling

Nests of Canada geese and mallards located on and around the airfield are subjected to egg addling to interrupt embryonic development and render them unviable. The Port's addling program is permitted through the federal depredation permit issued by the

USFWS. The protocol followed at PDX was adapted from the *Canada Goose Egg Addling Protocol* developed by the Humane Society of the United States (2000). A brief description of the protocol follows.

1. Mark each nest in a manner that allows for easy relocation for the subsequent visits required to complete the protocol.

2. Examine each nest to determine whether incubation has been initiated. If the eggs are warm, incubation has begun and the addling protocol may proceed. If the eggs are cold, the egg laying process is not yet complete. The nest is revisited every several days until incubation is established.

3. Upon confirmation of incubation, age eggs using the flotation test. If the eggs are less than 14 days old they will lie flat on the bottom and may be humanely addled. If the eggs are more than 14 days old they will float upright and are returned to the nest to complete development and the addling protocol is abandoned.

4. Eggs less than 14 days old are addled by vigorously shaking each egg for several minutes to detach and mix the interior contents. Each addled egg is marked with an indelible pen and returned to the nest to encourage continued incubation and minimize re-nesting efforts.

5. Each nest is revisited about 5 days after completion of addling. Any unmarked eggs are aged and addled if less than 14 days old by repeating the above protocol.

6. Record keeping is accomplished using AIRMAN® to record nest location and number, number of eggs in the clutch, date and time of all nest visits with actions taken, date of nest abandonment, and personnel involved. The results of the addling program are summarized and reported annually to the USFWS during the renewal process for the Migratory Depredation permit.

5.1.7. Lethal Action

GENERAL POLICY

The policy of the Port is to use lethal control only as a last resort after all other reasonable non-lethal options have been exhausted, and when there is an ongoing threat to public safety. If the need arises, the Port is committed to using lethal control in a reasoned, humane, controlled, limited, and efficient manner by trained staff.

Lethal action on birds is allowed under an MBTA depredation permit issued by the USFWS as well as by City ordinance, and will always be accomplished in accordance with permit guidelines. Lethal action using firearms is authorized at the program level by the Director of Aviation; the Transportation Security Administration (TSA); the PDX Aviation - Security and Public Safety Department; and the PDX Police Department.

For Security reasons and in the interests of ensuring that Wildlife staff are readily identifiable as Port employees, high visibility emergency vests are provided that are clearly marked “PDX Wildlife”, and are required to be worn while on shift airside.

In situations of heightened security (for example when Air Force One is arriving or departing PDX), the PDX Police Chief or his designee will advise Wildlife staff of any security constraints, including restrictions on the use of firearms.

There are three situations that may warrant lethal action against wildlife at PDX. They are:

1. To humanely dispatch an animal that is obviously injured beyond hope of rehabilitation.

2. To address an immediate and ongoing threat to aviation safety in an emergency situation.

3. As a population control measure to address an ongoing concern for aircraft safety.

Each of these situations has a different decision maker, method, and documentation required. Each will be outlined below.

To Dispatch an Injured Animal

Wildlife staff may encounter situations in which an injured, sick, or wounded animal is found at PDX that is beyond hope of rehabilitation. Trained staff asses the condition and implement the most appropriate action to be taken for efficient euthanasia.

Decision Maker: Wildlife Staff at PDX may implement direct lethal action to end an animal’s suffering if the situation does not warrant transportation to a rehabilitation facility. This will not normally require the use of firearms.

Method: In this case, euthanasia will be done in the most expedient and humane manner possible dependant on the species involved.

Documentation: An entry in the AIRMAN database will be made following this lethal action to document the situation in detail.

To Address an Immediate and Ongoing Threat to Aviation Safety

Hazing and harassment techniques are always the first strategy to attempt to move an animal away from aircraft operating areas. If non-lethal strategies have been implemented repeatedly, and have proven ineffective, and if the wildlife hazard poses an ongoing threat to aviation safety, it may become necessary to remove the animal using lethal means.

Decision Maker: The decision to immediately dispatch an individual animal that poses an *ongoing threat* to aviation safety lies with the Aviation Natural Resources and Wildlife

Managers. An example of an ongoing threat to public safety would be an animal that has entered the security perimeter of the airfield, is unresponsive to repeated attempts to haze it from the airfield, and repeatedly maneuvers itself into a position that poses an ongoing danger to air traffic. In these types of cases, lethal action would be focused only on the problem individual rather than as a means of population control.

Method: The method of lethal removal will be based on the species encountered. Wildlife staff may use Port firearms that they have received training on for use in lethal control. In most situations, a 12-gauge shotgun will be used in accordance with permit conditions. Only staff that have completed firearms training and have demonstrated proficiency using the equipment will be authorized to use lethal control with this equipment. Personnel responding to this situation will always consider public safety, safety of staff involved, and protection of airfield resources such as signs, buildings, or equipment when discharging live rounds.

Implementation Protocol

Once a problem individual animal has been identified and the decision has been made to target that individual for direct lethal control:

- Wildlife staff will advise Airfield 1as early in the shift as practicable of the situation and of the intent to take lethal action during that shift should the opportunity present itself.

- Wildlife staff will carry the appropriate firearm and ammunition in the Wildlife vehicle [Note: Wildlife staff will not routinely carry live ammunition or firearms other than pyrotechnic devices in the vehicles].

- If/When the opportunity to take direct lethal action presents itself, Wildlife staff will advise Airfield 1 and PDX Communication Center by radio that he/she is about to take that action. This coordination will keep Airfield 1 apprised of the pending action, and enable Airfield 1 to in turn apprise Wildlife staff of any circumstances on the airfield that may be pertinent.

- Following implementation of lethal control, Wildlife staff will advise Airfield 1 and the PDX Communication Center that lethal control operations have been terminated.

- The Aviation Director, Chief of PDX Police, and the Media Relations Manager will be notified via email to keep them aware of the situation.

- Should the lethal action be unsuccessful [the animal is wounded], Wildlife staff will take whatever actions are necessary to resolve the issue as expeditiously and humanely as possible with as little disturbance to airfield operations as possible. Airfield 1 will be kept apprised of the situation until it is resolved.

Documentation: After the ongoing threat has been resolved, the Wildlife staff member on duty during the incident will complete and file a Wildlife Lethal Action Record (included in Appendix I) to the Aviation Natural Resources and Wildlife Managers for the

record. This information will be passed onto the Aviation Director and the Media Relations Manager.

As a Population Control Measure

Decision Maker: The decision to begin a new lethal control program against a wildlife species of concern will be determined by the Aviation Natural Resources Manager, in consultation with the Aviation Wildlife Manager. This is a population control decision, not control of a specific, individual animal. Special circumstances do exist where lethal action may be employed to reduce the population abundance of a wildlife species on or around PDX. These situations usually involve prey species (e.g., small mammals, insects) that provide an attractant food source to larger wildlife that can pose a hazard to aircraft, or involve non-native or nuisance wildlife species that may pose a hazard to aircraft because of their flocking behavior (e.g., European starling, rock doves). PDX has developed protocols for the trapping and lethal removal of European starlings, as described on page 70.

Method: In situations where lethal control is used as a population control measure, the method will be determined based on the species involved. Every effort will be made to use a method that is humane, does not place undue stress on the animal, does not endanger non-target wildlife, and does create any other environmental concerns.

Documentation: Documentation will be made by the Aviation Natural Resource Manager or designee. The written finding will document that the following threshold criteria have been met and no other reasonable means are available:

1. The presence or behavior of wildlife is posing a significant ongoing concern for aviation safety.

2. All methods of hazing or harassment have been tried and repeated with ineffective results.

3. All reasonable means of habitat and/or behavior modification have been exhausted.

4. Trapping and relocation is not a viable alternative.

5. Potential adverse environmental effects or consequences have been identified and can be reasonably managed.

6. Permits are in place for the species in question.

7. Notification requirements have been identified and implemented, including contact with regulatory agencies and the Wildlife Advisory Committee.

All findings shall be in writing and evaluated on at least an annual basis. An emphasis shall be placed on the identification and implementation of actions that can be taken to avoid the need to use lethal actions in the future. The decision process for authorizing lethal action is outlined in Figure 11.

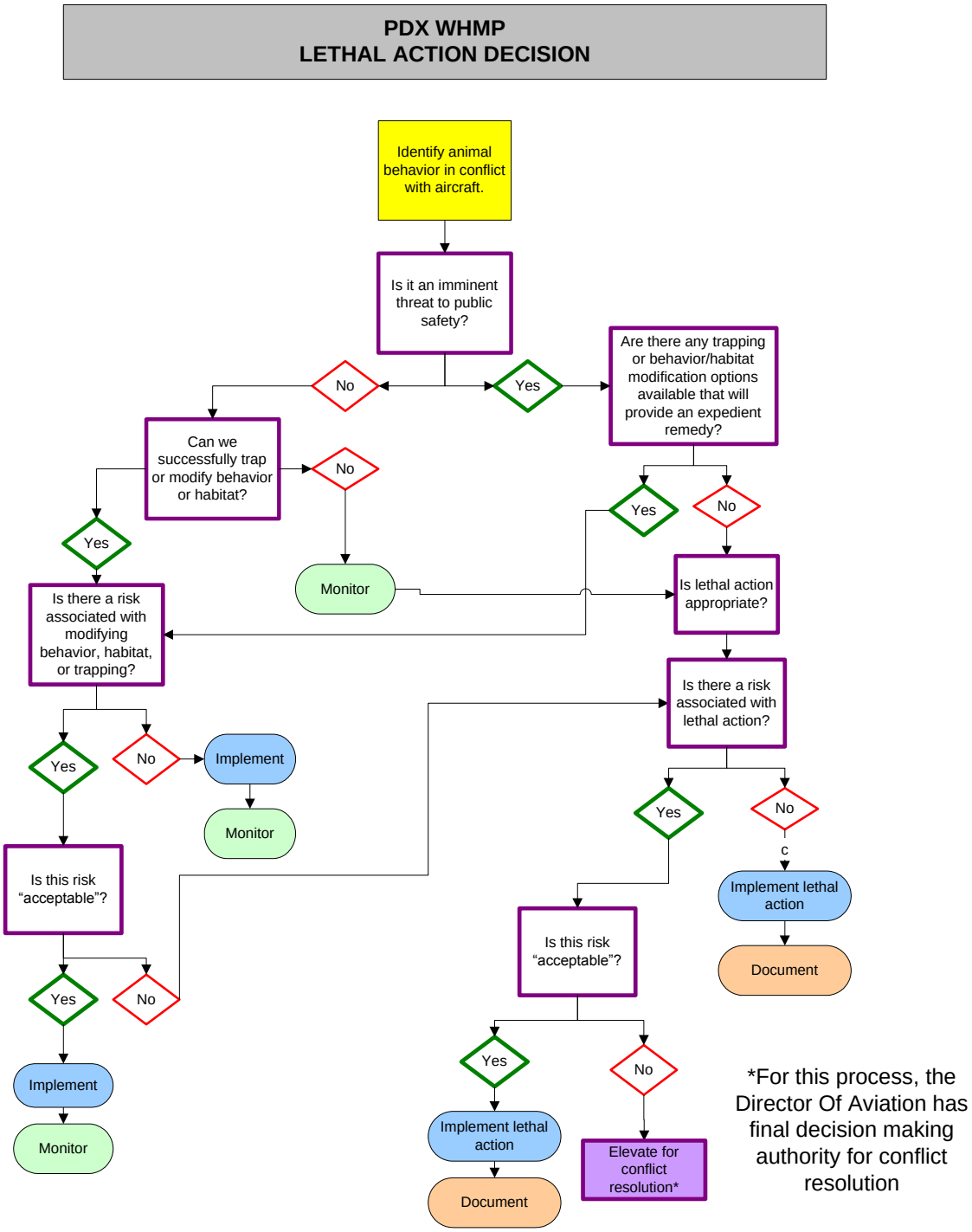


Figure 11. Lethal action decision flowchart

European Starling Trapping Protocol

Materials

Modified Troyer V-Top traps with a funnel opening sized to that of a starling will be used to minimize the capture of non-target species. Traps will be baited with corn or potato chips. Other equipment needed for the trapping effort includes a CO_2 canister, garbage bags and an evacuation tube.

Trapping Conditions

1. While the traps are active, birds will be provided with food, water, and shelter from the weather. The Port will make every attempt to provide humane conditions for birds in traps.

2. Birds will not be left in the traps for more than three days, and will be removed more frequently during those seasons when large numbers are being trapped.

3. Dead birds will be removed from the traps daily.

Euthanasia Protocol

1. Before euthanasia of starlings is performed, all non-target birds will be removed from the traps and released.

2. When removing starlings from the traps, the triangular opening will be removed and the evacuation chimney will be put in place. A garbage bag will be placed on the end of the evacuation tube. Starlings will be hazed into the evacuation tube. [Some starlings may be left in the traps to lure other birds in.]

3. When all of the birds are in the garbage bag at the bottom, the extra air will be removed from the bag, and CO_2 will be released into the bag at amounts sufficient to ensure a quick death. Euthanized starlings will be transported to a local incineration facility within 12 hours, or will be frozen for transport at a later time.

4. When appropriate, and only as authorized under PDX's Scientific Taking Permit (Salvage), starlings may be transported to other educational and research facilities for use.

Data Recording

After each trap is serviced, the number of starlings euthanized will be recorded in the AIRMAN database.

5.2. Habitat Modification

The long-range goal for PDX is to minimize the risk to aviation safety posed by wildlife species of concern on and around the airfield. With regard to wildlife habitat, this is accomplished by: 1) modifying habitats on Port-owned lands that are known to be attractive to wildlife species of concern, and 2) discouraging land use practices on non-Port lands adjacent to the airport that, in attracting wildlife species of concern, contribute to unacceptable wildlife hazards (in accordance with FAA AC #150/5200-33). Habitat modification is the most effective long-term remedial measure for reducing wildlife hazards on or near the airfield.

Habitat modification includes the physical removal, exclusion, or manipulation of features or characteristics (both natural and constructed) that are attractive to wildlife species of concern. The objective is to make the airfield less attractive to wildlife species of concern at PDX, thereby reducing the probability of a wildlife aircraft strike. Habitat modifications are closely monitored to verify that they are effective in reducing wildlife hazards, and do not create new wildlife problems. Any recommended changes to habitat management at PDX will be incorporated into the Annual report submitted to the FAA.

5.2.1. Port-Owned Property

The Primary Zone is owned primarily by the Port of Portland and controlled by the Aviation Division. Since it encompasses the AOA and associated RPZs, it is a dedicated land use for aircraft movement. Therefore, the City of Portland has waived all building code enforcement in this zone (CUMP, Oct. 2003) and defers to landscape standards in this plan for vegetation management.

Because this zone is in the immediate vicinity of aircraft movement, the risk is higher if wildlife species of concern are in the area. Therefore, all wildlife concerns identified within the Primary Zone will have priority over other projects that may fall in the Intermediate or Secondary Zones.

Many of the areas in the Intermediate Zone are owned by the Port. They may be managed by PDX staff or staff from other Port operating areas. If a wildlife attractant determined to pose an unacceptable risk is identified on Port-owned lands in the Intermediate Zone, the Aviation Natural Resource Manager will meet with the appropriate Port manager to discuss modifications to the habitat for wildlife control efforts. In addition, the Aviation Natural Resource Manager and/or Wildlife staff will be consulted whenever modifications or new land uses are proposed for Port-owned lands adjacent to PDX, to ensure that new attractants for wildlife species of concern are not created.

5.2.2. Non-Port Owned Property

To maximize the effectiveness of the WHMP, the Port must understand how wildlife habitat on non-Port owned properties in the Intermediate and Secondary Zones can influence the local distribution, movement and habitat use patterns of wildlife species of

concern. The attractiveness of these non-Port owned properties to wildlife species of concern can influence whether and how often these species will use the airfield or cross the airfield to access other habitats. Wildlife management practices that are implemented on these properties also have the potential to move wildlife onto the airfield, or to increase the frequency of birds flying across aircraft flight paths.

Within this context, the Port discourages land use practices that are known attractants of wildlife species of concern on non-Port lands in the Intermediate and Secondary Zones, consistent with FAA AC 150/5200-33. The risk evaluation process is used to assess whether the level of risk expected from actions in the Intermediate and Secondary Zones would be acceptable. The Wildlife Manager, in cooperation with the Aviation Natural Resources Manager and other Port staff, will participate with local, state and federal agencies on land-use decisions that would possibly increase the attractiveness of the properties surrounding the airport to wildlife species of concern. Proposed land use projects that will likely increase populations of species of concern, or their activity within aircraft flight zones, will be discouraged. The FAA Regional Airport Division provides technical guidance to airport operators, and local/state governments, in addressing land use compatibility issues. Guidance on incompatible land uses near airports can be found in FAA AC 150/5200-33 (Appendix D).

The paragraphs below describe some of the Port's strategies for managing potential wildlife hazards on non-Port owned properties in the Intermediate and Secondary Zones. More detail can also be found in Section 5.4, WHMP Information and Education. Knowledge gained from the Port's risk analysis will be used to inform future decisions regarding land uses in the Intermediate and Secondary Zones.

Golf Courses: PDX is bordered by four golf courses that can be attractive to wildlife species of concern because of their short green grass, open water, and large trees. The Port has met with the managers of these golf courses to discuss their wildlife situation and any management techniques they may use. Most of these golf courses do not currently have aggressive wildlife management practices in place to control problem wildlife, and only use occasional pyrotechnics or a trained dog to disperse geese during the migration season. They have agreed to avoid moving birds, especially flocks of geese, toward PDX. The golf course managers are amenable to coordinating with PDX if their situation changes and they begin an aggressive program. Golf course managers have also provided access to Wildlife staff for surveying raptor and waterfowl nests on the golf courses.

Private Lands: There are adjacent properties owned by private landowners that are used for residences. To date, no significant wildlife issues have arisen with any private landowners regarding the WHMP. Should an issue arise, however, the Port would approach the landowner and explain the association between the wildlife issue on their land and the WHMP. If needed, the Port would use the guidance in the Advisory Circular 150/5200-33 and ask for support from the FAA to encourage the landowner to modify any land use or practice found to pose an unacceptable risk to safe aircraft operations. The Port's Community Affairs Department would assist in these outreach efforts.

Proposed New Land Uses: The Port uses the guidance in AC 150/5200-33, and its technical experience, to determine whether a proposed land use may result in a wildlife

hazard that is incompatible with safe aircraft operations. If a new land use were proposed that is not recommended by the FAA, the Port would evaluate this land use using the accepted forums.

The Oregon Department of Aviation, Board of Aeronautics, is an active member of the WAC. This allows the Port to hear of proposed land use changes that may be in conflict with safe aircraft operations, such as the location of wetland mitigation sites or wastewater treatment plants in the Secondary Zone. In addition, the Port's Planning and Development, and Aviation Planning departments are often involved in local land use decisions, and coordinate with the Aviation Natural Resource Manager to ensure that no new wildlife attractants with unacceptable risk are planned for adjacent properties.

Airport Futures is a collaborative effort between the City of Portland, Port of Portland, and the Portland-Vancouver metropolitan community to create an integrated long-range development plan for PDX. The Wildlife Hazard Management program can benefit from this process by working together to achieve a common goal of implementing compatible land uses that are not in conflict with safe aircraft operations.

The movement of wildlife species of concern between adjacent lands and aircraft flight paths, and how wildlife use specific areas is a complex issue. There may be times that it is beneficial to have an area that draws wildlife species of concern away from the airfield. This must be balanced with the potential hazard of having an area near PDX that is attractive to wildlife species of concern. The decisions about habitat modifications or land uses must be made using the best science, expertise, and risk model data available to ensure that no new attractants that pose an unacceptable risk to aircraft operations are located on the perimeter of the PDX airfield.

5.2.3. Water Management

Because of the attractiveness of water features including natural wetlands, man-made wetlands, stormwater facilities, and other standing water to wildlife species of concern, the Port will examine the need for removing or modifying those water features located on Port property in the manner described below. Any actions taken would be designed to encourage wildlife species of concern to disperse to other habitats farther away from the airport where their presence would pose a lower risk to aircraft operations.

Wetlands and other Waters of the U.S.

The Port will apply for permits to modify or fill those existing jurisdictional wetlands and other waters of the U.S. that lie within the Primary Zone and that, by attracting hazardous wildlife species, present an unacceptable risk to safe aircraft operations. The Port will investigate options for converting and maintaining these areas either in an upland condition or a non-hazardous wetland condition, if such an opportunity exists. In accordance with FAA AC 150/5200-33, mitigation for the removal of these wetlands and other waters of the U.S. should occur off-site on lands outside of the Secondary Zone, unless the risk evaluation indicates the level of risk incurred would be acceptable. The Port will take appropriate actions to prevent new jurisdictional wetlands or other waters of the U.S. from developing in the Primary Zone (see following section).

Jurisdictional wetlands and other waters of the U.S. that lie on Port lands within the Intermediate Zone will be monitored as potential attractants for wildlife species of concern. If use of these sites by wildlife species of concern is documented, and this use contributes to an increased presence of wildlife species of concern in the Primary Zone management actions will be taken consistent with Part 139. Actions may range from seeking a permit to fill the wetland or waters of the U.S. to modifying the wetland to make it less attractive to wildlife species of concern (e.g., vegetation modification, installation of netting). The Port will take appropriate actions to prevent new jurisdictional wetlands or other waters of the U.S. from developing on Port-owned lands within the Intermediate Zone, unless the risk evaluation indicates the level of risk incurred would be acceptable.

Standing Water and Poor Drainage

Areas in the Primary Zone with standing water, when determined not to be jurisdictional wetlands or waters of the U.S., will be filled and/or graded to allow water to consistently drain into ditches and stormwater detention facilities. In accordance with direction in AC 150/5200-33, ditches should be appropriately sloped so that water does not pool and will drain from the airfield in an expedient manner, and rocked to top of slope or otherwise managed to avoid emergent vegetation. Several open drainage ditches remain that cross the airport inside of the security perimeter fence; however most have been incorporated into an underground storm water drainage collection system.

Nonjurisdictional areas of standing water and poor drainage on Port-owned lands in the Intermediate Zone will be monitored as potential attractants for wildlife species of concern. If use of these sites by wildlife species of concern is documented, and this use contributes to an increased presence of wildlife species of concern in the Primary Zone, a risk evaluation will be conducted to determine the level of risk and inform future decisions regarding appropriate actions to eliminate or minimize the drainage problem (e.g., grading, improved drainage facilities), when warranted.

The following protocol has been developed to manage nonjurisdictional “wet areas” on Port-owned lands at PDX so they do not develop into jurisdictional wetlands at a future date.

1. The Aviation Natural Resources program is responsible for inspecting PDX properties and identifying and tracking areas that have the potential of forming jurisdictional wetlands.

2. If the Aviation Natural Resources program identifies an area that has the potential of becoming a jurisdictional wetland, and through verification the area has not become a jurisdictional wetland, they will notify the Maintenance Operations Center (MOC) and request action to resolve the drainage problem.

3. If Maintenance does not have the resources to eliminate the wet area (i.e., the drainage problem cannot be resolved through surface grading), Natural Resources staff will refer the request to either the Facilities Services Department or the Planning and Development Department who will assign an Aviation Project Manager.

4. The Aviation Project Manager will take necessary actions through the engineering process or hiring a contractor to resolve the drainage problem. The Aviation Project Manager upon direction of the Finance Department will determine the funding source.

5. The Aviation Natural Resource program will communicate any potential projects to the Airfield Planning Group who will attempt to combine mitigation measures with already scheduled airfield projects.

Stormwater Management Facilities

Many common stormwater management options are highly attractive to wildlife such as detention ponds, infiltration basins, and swales. The type of stormwater facility and location relative to the airport determines whether or not it will become a hazardous wildlife attractant. There are many stormwater management options available that achieve the desired stormwater quality and quantity results without attracting hazardous wildlife. Also, traditional stormwater facilities can be designed or modified to be less attractive to wildlife. This section describes how stormwater on and around PDX should be managed to reduce the attractiveness of facilities to wildlife.

Any existing stormwater detention ponds located in the Primary Zone, or on Port-owned land in the Intermediate Zone, are continually monitored as potential attractants for wildlife species of concern. If use of these sites by wildlife species of concern is documented, and this use contributes to an increased presence of wildlife species of concern in the Primary Zone, a risk evaluation will be conducted to determine the level of risk and inform future decisions regarding appropriate actions to eliminate or minimize the hazard, when warranted. Actions may range from removing or reconstructing the stormwater detention pond to modifying the pond to make it less attractive to wildlife species of concern (e.g., vegetation modification, installation of netting). AC 150/5200-33 provides guidance for addressing existing stormwater management facilities on or near public-use airports. Other stormwater treatment options such as swales can also be modified to become less attractive to wildlife by modifying vegetation from emergent to shrub scrub or by removing emergent vegetation and replacing it with rock to hide any free standing water.

New stormwater management in all three zones should at a minimum comply with the guidance established at the federal and state level. The federal guidance is found in FAA Advisory Circular 150/5200-33 section 2-3.b, Hazardous Wildlife Attractants on or Near Airports. This guidance states: “Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48-hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from the airport’s AOA, airport operators should use physical barriers, such as bird balls, wire grids, pillows, or netting to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife." If, despite these guidelines, any existing or new stormwater detention structure attracts wildlife species of concern, a risk evaluation will be performed to determine if additional modifications are necessary.

The state guidance is found in the State of Oregon Airport Rules (OAR) 836.623. This guidance states: no new water impoundments of one-quarter acre or larger shall be allowed 1) within an approach corridor and within 5,000 feet from the end of the runway, or 2) on land owned by airport or airport sponsor where the land is necessary for airport operations.

Within the Primary Zone and on Port owned property within the Intermediate Zone stormwater treatment options are even more limited by the WHMP. New stormwater detention ponds are prohibited in the Primary Zone. If located on Port-owned land in the Intermediate Zone detention ponds will be designed in accordance with AC 150/5200-33 and any new holding ponds or detention basins must be completely covered. Netting new open water features is not allowed because it does not hide the water surface; the covers must be solid. Other stormwater treatment options such as swales, filter strips, and sand filters may be allowed but must be approved by the Wildlife Manager. Wildlife staff will review all project proposals with new stormwater treatment in the Primary and Intermediate Zones. If proposals are incompatible with the WHMP Wildlife staff will work with project managers to identify stormwater treatment options that will not create a wildlife attractant.

Although the airport does not have direct control over stormwater management in the Secondary Zone, the wildlife program defers to the federal and state guidance for managing stormwater facilities at and around airports. In general, the secondary zone is far enough away from the airport that most stormwater treatment facilities will not create an aviation hazard however there are some exceptions. New water impoundments greater than one-quarter acre have the potential to draw in large numbers of waterfowl which could be a hazard to aviation depending on where they are located relative to the airport within the Secondary Zone. As a result, the wildlife staff will review land use proposals for projects in the Secondary Zone that are proposing large water impoundments to determine that federal and state guidance is being followed.

Other Constructed Water Features

Any other existing, man-made open water features (e.g., fountain or landscaping pond) that lie in the Primary Zone, or on Port-owned land in the Intermediate Zone, will be monitored as potential attractants for wildlife species of concern. If use of these sites by wildlife species of concern is documented, and this use contributes to an increased presence of wildlife species of concern in the Primary Zone, a risk evaluation will be conducted to determine the level of risk and inform future decisions regarding appropriate actions to eliminate or minimize the hazard, when warranted.

Any new water features proposed for the Primary Zone, or on Port-owned land in the Intermediate Zone, will be assessed for their potential to attract wildlife species of concern. Either appropriate design criteria will be incorporated to minimize the hazard, or the water feature will be eliminated unless it can be demonstrated that the water feature would not present an unacceptable risk to the safe operation of aircraft.

Runways, Taxiways, and Aprons

Airport Operations Department personnel and Wildlife staff will be responsible for identifying those areas of the runways, taxiways and aprons where pools of water consistently form after periods of rain. Areas where water regularly pools on pavement surfaces will be identified, mapped and the information forwarded to Engineering, Construction and Maintenance Departments to be physically corrected.

5.2.4. Vegetation Management

Landscaping

Landscaping at PDX can affect tourism, business, and the overall feeling for the Portland vicinity to visitors. With this in mind, landscaping needs to be aesthetically pleasing. However, it must also coincide with the airport's greater responsibility for aviation safety. The goals of PDX landscape management within the built environment at PDX are to reduce the attractiveness of the airport to wildlife species of concern and to eliminate the vertical intrusion of vegetation into aircraft operating airspace while retaining an aesthetically pleasing landscape.

FAA Advisory Circular #150/5230-14 issues guidance for airport planners and operators on the use of tree and vegetation screens around airports and aircraft operating areas for noise control purposes. This Advisory Circular also discusses the advantages and disadvantages of the use of screens and addresses bird hazard potentials due to vegetation. Section 14 of the Advisory Circular states:

> "Prior to any decision to utilize tree or vegetation screens for noise control, their potential for creating a bird hazard to aircraft must be carefully weighed against the anticipated noise benefits. Wooded areas and vegetation often attract birds by providing feeding, nesting and/or roosting areas. This is particularly true at junctions of wooded areas and grasslands and where two distinctly different vegetative communities join. Hedgerows are also highly attractive as shelters for birds and small mammals and should be avoided. For the same reason, the planting of trees and shrubs is not recommended closer than 600 feet (180m) to the centerline of active runways and taxiways. In considering the use of tree vegetation belts as noise screens, the following factors should be considered: the type, size, feeding, and migratory habits of the area bird population; the geometric relationship and proximity between local feeding and nesting grounds, the proposed noise screen, and the aircraft operating areas; and the affinity of the trees and vegetation to attract birds."

In addition, as stated in FAA Advisory Circular 150/5200-33 section 2-8:

> "There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants….are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace….therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community…."

Additionally, the 2005 Wildlife Hazard Management at Airports Manual, written jointly by the FAA and USDA specifically states:

> "Do not use trees and other landscaping plants for the street side of airports that produce fruits or seeds attractive to birds. Avoid plants that produce fruits and seeds desired by birds. Also avoid the creation of areas of dense cover for roosting, especially by European starlings and blackbirds. Thinning the canopy of trees, or selectively removing trees to increase their spacing, can help eliminate bird roosts that form in trees on airports."

In support of this guidance the Port has developed a set of landscaping design standards for use within the Primary and Intermediate Zones (Figures 6 & 7) that address plant species and planting standards for spacing of trees and shrubs within the built environment at PDX. A list of trees, shrubs, and groundcover for vegetation is comprised of species screened by PDX Wildlife staff for general wildlife attractant features such as fruit, berries, height, density, branching structure, crown shape, planting density and arrangement, and location relative to the Primary Zone and significant habitat features (see Appendix J, List of Approved PDX Plants). This landscaping list is a refinement of the list developed for the 2004 WHMP. The list is subject to revision whenever new candidate plants are submitted for variance granted they meet the screening criteria and are accepted by all members of the Port Landscaping Committee. The process for receiving a variance to the PDX Approved Plant List entails completing the PDX Plant List Variance Request Form (see Appendix K). Specific instructions for receiving a variance to the PDX Approved Plant List are included on the form. Variances to the PDX Approved Plant List will only be granted in instances where it can be proven that circumstances prohibit use of species found on the PDX Approved Plant List

The PDX landscaping standards within each zone are described below. For the purpose of these guidelines please reference the following definitions of trees and shrubs taken from the Utah State University Agricultural Extension Office. A plant will be defined as a tree based on having the characteristics of being a woody plant having one erect perennial stem (trunk) at least 3 inches in diameter at a height of 4 ½ feet above the ground, a definitely formed crown of foliage, and a mature height of at least 13 feet. A plant will be considered a shrub if it is a woody plant with several perennial stems that may be erect or may lay close to the ground, usually having a mature height less than 13 feet and stems no more than around 3 inches in diameter.

Primary Zone

The Primary Zone is currently exempt from City of Portland landscaping requirements. No City of Portland environmental zones are located within the Primary Zone. All landscape management within the Primary Zone will be driven by the operational and

safety needs of the Airport. PDX landscaping standards for the Primary Zone are as follows:

Existing Landscaping

- Existing trees, shrubs, and other landscaping will be assessed. Any landscaping that is documented to pose a significant wildlife hazard to safe aircraft operations will be immediately removed.

New Landscaping

1. Each new landscaping project within the Primary Zone will be reviewed by Aviation Natural Resources staff, PDX Wildlife Manager and other Port stakeholders before landscaping designs are finalized.

2. Landscaped areas within the Primary Zone, including tenant landscaping, will only include shrubs and groundcover. No new trees will be allowed. Species of vegetation must be represented on the Primary Zone PDX Approved Plant List, or be demonstrated to meet the wildlife attractant screening criteria and accepted through the variance process prior to planting. See Appendix J, List of Approved PDX Plants. Design of the landscaping must also comply with the standards outlined in this document.

3. Trees that penetrate 14 CFR Part 77 Transitional Surfaces, and are demonstrated as contributing to hazardous wildlife conditions, will be removed rather than topped. Topping of trees creates an attractive platform for raptor nests, exacerbating bird strike potential. Topping trees is also inconsistent with the City's Urban Forestry accepted practices.

4. No shrubs will be allowed within ten (10) feet of the airfield perimeter fence. This requirement addresses security concerns as well as vertical structure and wildlife hazards.

5. Landscaping will be a combination of evergreen and deciduous species of shrubs, with no greater than 50 percent of evergreen species. No unbroken rows or clumps of evergreen shrubs will be allowed due to the shelter and insulation that is provided by contiguous crown cover.

Intermediate Zone

The Intermediate Zone is the zone between the Primary and Secondary Zones (see figures 6 & 7). It is defined as the Port owned aviation property outside of the Primary Zone and the land that falls under the FAA designated approach or transitional surfaces of the three runways. Landscaping in the Intermediate Zone should not create habitats attractive for wildlife species of concern at PDX. Therefore, the goal of landscaping in this zone is to provide a visually pleasing landscaped environment that does not constitute an unacceptable wildlife risk to aircraft operations. All landscape management within the Intermediate Zone will consider the operational and safety needs of the airport. There may be potential modifications to these standards resulting from ongoing

risk analysis. Additionally, all plants allowable in the Primary Zone may be used in addition to those plants listed for use in the Intermediate zone. Currently the PDX Landscaping Standards for all lands in the Intermediate Zone are as follows:

Existing Landscaping

- Existing trees, shrubs, and other landscaping will be assessed. If any landscaping is documented to pose a significant wildlife hazard to safe aircraft operations, a proposal for vegetation modification will be presented to the appropriate Port department manager to address the issue.

New Landscaping

1. Because of the potential for landscaping to support wildlife species of concern that could pose an unacceptable risk to aircraft operations, aviation wildlife concerns need to be incorporated into landscape project planning in the Intermediate Zone.

2. Species of vegetation must be represented on the PDX Intermediate and/or Primary Zone Plant Species list, or be demonstrated to meet the wildlife attractant screening criteria and be accepted through the variance process (Appendix K) prior to planting. See Appendix J, List of Approved PDX Plants. Design and installation of landscaping should comply with the spacing and arrangement guidelines outlined below.

3. Trees species should be selected and planted so that, at maturity, overlapping crown structures that are attractive to starlings or other wildlife species of concern will be minimized (see Figure 12). In an effort to ensure that there are no areas within the landscaped environment with contiguous canopy cover the Port has developed tree spacing guidelines. These guidelines were developed by looking at the documented maximum mature spread of each species on the PDX Approved Plant List as noted on the list. In order to maintain a minimum of 15ft spacing between mature crowns the tree species on the PDX list were grouped into three categories. The first group includes species with a maximum spread at maturity between 10 and 15ft. To maintain 15ft between the crowns of these species the trees will be required to be planted at a distance of 25ft on center. The next group includes species with a maximum spread at maturity between 20 and 30ft. To maintain 15ft between the crowns of the species in this group these trees will be required to be planted at a distance of 40ft on center. The last group includes a few of the larger tree species on the PDX list. The maximum spread at maturity for these trees is between 40 and 75ft. To maintain 15ft between the crowns of these species during their foreseeable life in a landscaped environment these trees will be required to be planted at a distance of 60ft on center.

Figure 12. Overlapping crown structures that allow birds to move safely from tree to tree without exposure to predators or weather

4. Trees approved for planting should have varied canopy types and varied heights, both at time of planting and at maturity. This will discourage homogeneity, which attracts starlings (a wildlife species of concern) and other flocking species due to its increased thermal cover and protection from predation. No uniform, even, or continuous canopies will be allowed. In addition, trees will be planted in a manner such that there are no more than 20% evergreen trees per project.

5. Selection of shrubs should be a mix of deciduous and coniferous species with no more than 50 percent evergreen species, planted to avoid continuous blocks of evergreen cover. Selection will be based on a preference for species that do not exceed a height of seven (7) feet at maturity[4]. Shrubs will be planted 10 feet away from all trees[5]. (See Figure 13)

[4] This standard does not include plantings for the Columbia South Shore Marine Drive Standards. The shrubs on this list may not be higher than five (5) feet at maturity.

[5] These on-center planting criteria apply specifically to interior and perimeter landscaping standards for parking lots, and do not necessarily apply universally in the Secondary Zone.

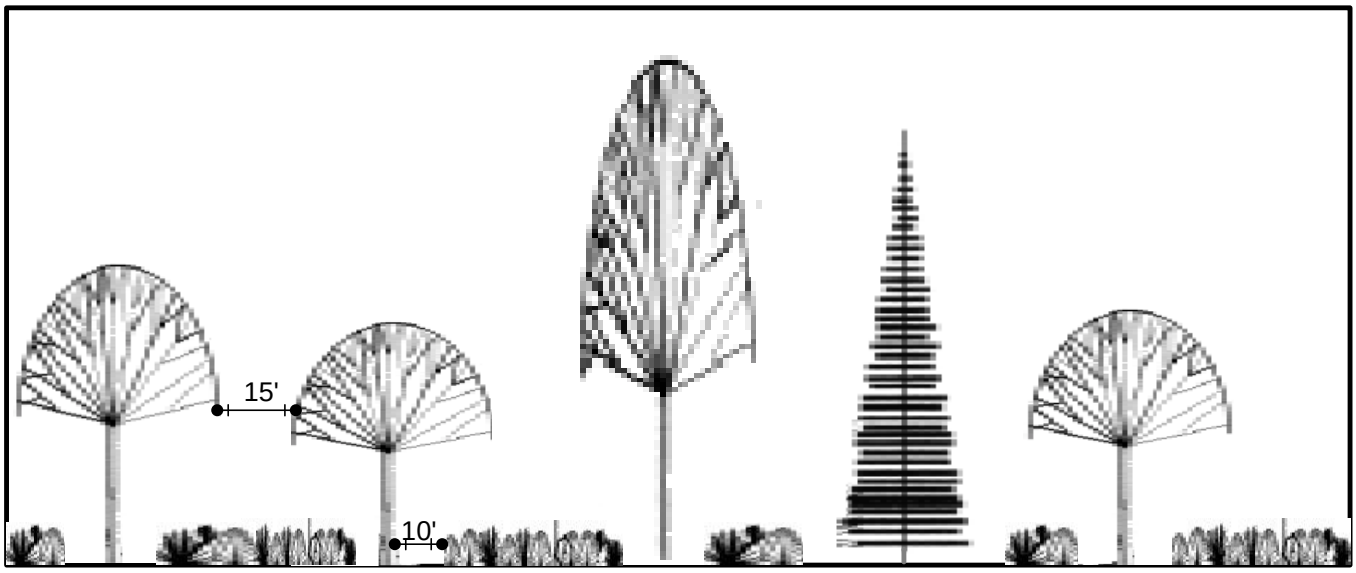


Figure 13. Conceptual landscaping design for the Secondary Zone that demonstrates discontinuous crown closure at both a vertical and horizontal scale.

6. Tree species selected should tend toward columnar shapes, which have a vertical branching structure that minimizes perching and nesting opportunities for birds. (See Figures 14 and 15).

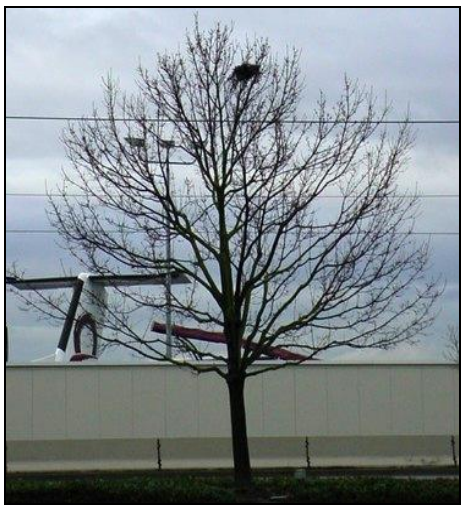


Figure 14. An example of a tree species that is attractive to birds because of its horizontal branching structure.

Figure 15. An example of an ideal tree type for landscaping at PDX because it has minimal opportunities for perching and nesting due to its vertical branching structure.

7. Sterile (non-fruiting) varieties of trees will be maintained and utilized.

8. If, despite following the above guidelines, any landscaped area is documented by the Port to be a safety, security or wildlife hazard, it will be managed using appropriate wildlife hazard minimization techniques such as pruning, thinning, or selective harvesting. No planting of new trees will be permitted in the areas with documented hazards. Trees removed as documented hazards may be replaced with approved shrub species at densities meeting the PDX landscape management standards.

Grass Management

Grass is the primary ground cover currently used in undeveloped areas inside the Primary Zone. This ground cover is generally preferable to paving because it visually defines the AOA for approaching aircraft, is more economical to maintain over time, and it provides a pervious surface for stormwater management. Unfortunately, this maintained short-grass cover also provides foraging opportunities for a variety of birds including European starlings as well as suitable habitat for gray-tailed voles and other small mammals that are a primary food source for a number of wildlife species of concern at PDX (e.g., red-tailed hawk, great blue heron, barn owl, great horned owl). If the Port's future risk evaluation efforts indicate that grass cover represents an unacceptable risk to safe aircraft operations by providing habitat to wildlife species of concern, other cover options will be considered (e.g., alternate ground cover mixes, paving, grass-crete, artificial turf). Unnecessary and unwanted weeds and brush (e.g., Himalayan blackberry) are removed from all areas within the Primary Zone. Noxious

vegetation found on the Intermediate Zone may be sprayed with an herbicide type agent, and/or physically removed.

Grass Type

The type of grass currently planted and maintained in the Primary Zone, and over much of the Port-owned land in the Intermediate Zone, is a low-maintenance tall fescue seed mix. This grass mix grows very well under the normal climatic conditions of the region and on the sandy well-drained soils found around PDX. Any future changes to this seed mix shall be reviewed for its palatability to wildlife species of concern and/or their prey before being used.

Grass Height

Much research has been conducted on the optimum grass height to deter birds that pose a hazard to aircraft. Since different bird species prefer different grass heights, there appears to be no single grass height that is effective at deterring all wildlife species. Most studies show that a compromise of 7 to 12 inches works best at deterring both small and large bird species. The Wildlife Manager will continue to follow the most recent grass height studies to determine the best grass height to deter wildlife species of concern at PDX.

Mowing

Grass mowing is conducted regularly in the Primary Zone during the growing season (April – October) to maintain grass at the heights recommended to deter wildlife species of concern. However, mowing itself can serve as an attractant for several species of birds considered to be wildlife species of concern (e.g., red-tailed hawk, great blue heron) because food sources such as insects, seeds and rodents become more readily available during and immediately after cutting. To avoid attracting wildlife species of concern near the runways, grass within a safety area around the runways will be mowed only at night with the runway closed. The safety area is defined as a 250-foot zone from the centerline of the runways that extends to 1,000 feet at the ends of the runways. Mowing within the safety zone may occur during the day if the runway is closed for other purposes. When a runway is closed due to mowing within the safety area, Wildlife staff shall ensure that wildlife species of concern have been sufficiently hazed from the area before the runway is reopened.

Mowing within the remaining portions of the Primary Zone outside of the safety area is conducted during daylight hours. Grass mowing on Port-owned lands within the Intermediate Zone occurs once per year during mid-summer. Whenever mowing contributes to an increase in activity and abundance of wildlife species of concern in the Primary Zone, hazing and harassment efforts will be increased to disperse wildlife and eliminate or minimize the hazard.

Certain portions of the airfield appear to be particularly favored by bird species of concern, especially the northern and western perimeters of the airfield. In addition, mowing can interact with bird life history patterns to temporarily increase use of the airfield by birds of concern. For example, if the initiation of spring mowing coincides with

the peak of spring migration in a given year, numbers of bird species of concern foraging on the airfield can spike dramatically. The thatch that remains after mowing also influences gray-tailed vole populations, a major prey species for many birds of concern at PDX, in ways not yet clearly understood. PDX will continue to investigate the dynamic relationship between use of the airfield by wildlife species of concern and grass mowing. Flexibility will be introduced into the mowing program so that the timing of, location of and types of equipment used in mowing can be adjusted to develop mowing prescriptions that reduce the attractiveness of the airfield to wildlife species of concern.

Drainage Channel and Stream Side Vegetation

Cattails, willows and other vegetation growing along the edges of drainage channels, or in other wet areas on the airfield, may provide high quality habitat for some wildlife species of concern. Unless otherwise indicated any vegetation that grows alongside these ditches within the Primary Zone will be maintained at the lowest possible height, so that nesting, hiding and foraging habitat is not provided for these species (e.g., great blue heron, mallard). Ditches should be inspected annually for debris and soil buildups that may impede drainage efficiency.

Agriculture

In the past, a variety of agricultural practices have occurred on Port-owned lands adjacent to PDX. These have included cattle grazing, hay production, and row crops. Recent actions by the Port regarding agriculture have been to phase out existing agricultural uses on Port-owned lands within the Primary and Intermediate Zones. No agricultural use currently occurs nor is allowed within the Primary Zone. All other agricultural leases on Port-owned land adjacent to PDX have been allowed to expire or have been terminated.

In the future, should the Port acquire new lands within the Intermediate Zone that are encumbered with agricultural leases, the Port will manage these lands following FAA regulations until such time as the leases can be terminated. FAA AC 150/5200-33, Section 2-6, (Appendix D) issues specific guidelines on the usage of airport properties for agricultural crop production. All existing and any future agricultural leases will be managed in accordance with this Advisory Circular. Farm practices that are known attractants to wildlife, such as discing, plowing and harvesting are and will continue to be regulated by the terms of the property lease.

Prior to the termination of any agricultural lease, Wildlife staff will evaluate the effect to wildlife species of concern resulting from the conversion of agricultural land to a different use, such as fallow land. Wildlife staff will work with the appropriate Port Land Managers to ensure that the new land use will not create a greater attractant to wildlife species of concern from that posed by the prior land use.

5.2.5. Structure Management

Human-made structures can provide cover, nest sites and perches for wildlife species of concern and their prey. A wide variety of structures exist at PDX that may receive use by wildlife, including airfield buildings, aircraft hangars, terminals, parking structures, light

poles, fences and navigational aids, among numerous others. If wildlife exclusion is considered during the initial design phase for a structure, future costly control measures and design retrofits can often be avoided. To this end, structures should not provide potential nesting, perching or roosting sites for bird species of concern and should not allow access to such mammals as coyotes, rabbits and rodents.

Management to reduce the attractiveness to wildlife of structures at PDX is a collaborative effort between Port Engineering, the Wildlife Manager, Airside Operations, Aviation Planning, and Aviation Maintenance. It includes a review of all proposed new construction during the initial project design phase, and the monitoring of existing structures for use by wildlife species of concern. Whenever a structure design issue is identified that may attract wildlife species of concern, the responsible PDX department will be contacted to develop corrective action. The goal is to resolve potential design problems before structures are constructed or erected.

Existing Structures

All existing structures located in the Primary Zone will be periodically monitored as potential attractants to wildlife species of concern. If use of structures by wildlife species of concern is documented, and this use is determined to represent a potential hazard to aircraft, a risk evaluation will be conducted to inform future decisions regarding appropriate actions to eliminate or minimize the hazard. Actions may range from the installation of features that deter wildlife from using existing structures (e.g., netting, fencing, spikes) to design modifications that make structures less attractive to wildlife species of concern.

Existing structures that lie on Port-owned land in the Intermediate Zone will be monitored as potential attractants to wildlife species of concern. If use of these sites by wildlife species of concern is documented, and this use contributes to an increased presence of wildlife species of concern in the Primary Zone, a risk evaluation will be conducted to inform future decisions regarding appropriate actions to eliminate or minimize the hazard.

New Structures

Any new structures proposed for the Primary Zone, or on Port-owned land in the Intermediate Zone, will be assessed for their potential to attract wildlife species of concern during the initial design phase for the project. Architectural plans will be reviewed, and appropriate design modifications will be incorporated into the structure to eliminate or minimize the potential attractiveness to wildlife.

Airport Improvement Projects and Airfield Buildings

The Wildlife Manager will participate in the initial phase of all airport improvement projects to evaluate whether proposed structures could result in increased wildlife hazards. Such projects include (but are not limited to); architectural changes, terminal expansions, building improvements and construction, and landscape and other land use changes. Every effort will be made to minimize or eliminate designs and land use

practices that may be attractive to wildlife species of concern, consistent with the Ports risk analysis.

Some buildings on the airfield were unintentionally designed with features attractive to wildlife species of concern. As these buildings are identified, and the source of the architectural attractiveness is identified, steps shall be implemented to modify the building to decrease or eliminate the attractive features.

Sliwinski (1995) and Transport Canada Environment and Support Services (1994) identify common design features attractive to certain species of wildlife that should be avoided. These include:

1. Large gravel roofs that can attract gull nesting colonies.

2. Overhanging roof ledges, external roof support structures and architectural details that provide nesting and roosting sites for birds. Sloping the ledges around a building to an angle greater than 45 degrees can limit the attractiveness for nesting and roosting.

3. Large buildings such as airport hangars that provide many places for wildlife to nest or roost. Often hangars have many holes and openings that birds may use to gain entrance. Blocking or covering all holes and vents is effective in restricting access by birds. Blocking or covering all drains can also prevent rodents from becoming a problem inside a building.

4. Excessive numbers of antennae, towers or overhead wires that provide perch sites for birds.

Abandoned Structures

Structures within the Primary Zone not pertinent to airport operations, and no longer in use, should be removed if they pose an unacceptable risk. This includes abandoned sheds, barns, machinery and poles. These unused structures may be attractive to rodents, small birds and rabbits, which in turn may attract wildlife species of concern (e.g., red-tailed hawks, great horned owls). Abandoned structures in the Intermediate Zone will be surveyed to determine whether they are being used by wildlife species of concern, and whether this use poses an unacceptable risk.

Airfield Structures

Airfield structures such as runway and taxiway signs, light poles, navigation aids and radar reflectors are often used as hunting and loafing perches for raptors and other birds. Opportunities for fitting these structures with exclusion and deterrent devices are monitored on an ongoing basis. An ongoing PDX project is currently retrofitting these structures with bird exclusion devices.

Physical Exclusion Devices

Many types of devices and materials are available to physically exclude certain wildlife species from particular areas. Examples currently in use at PDX include animal deterrent fencing, bird netting and anti-perch devices. A brief description of these devices follows.

Animal deterrent fencing

PDX maintains a 36,500-foot perimeter fence around the airfield. The fence serves the dual purpose of providing a security barrier for the airport and of excluding large mammals (e.g., black-tailed deer) from the airfield. The permanent, 8-foot high chain link fence includes a 4-foot apron of chain link fence buried horizontally at its base. This apron, which is tied into the vertical fence, is a very effective device for excluding a variety of medium-sized animals that attempt to access the airfield by digging under the perimeter fence (e.g., coyote). Design drawings and specifications for the animal deterrent fencing are presented in Appendix L. Problem gates through the perimeter fence are being retrofitted to limit access by large and medium-sized animals. Retrofitting typically involves reducing gaps around a closed gate to limit the opportunity for wildlife to squeeze under or between the gates. This is usually accomplished by lowering the existing gate to reduce the space between the bottom of the gate and the surface of the ground, raising the ground surface by adding asphalt (e.g., speed bump) when lowering the gate is impractical and/or attaching metal flashing to the bottom and edges of gates.

Specifications for all future perimeter fence construction require the inclusion of animal deterrent fencing.

The PDX design for animal deterrent fencing has been shared with many other airports that have problems with mammals accessing the airfield. The FAA has endorsed the design and is considering it for inclusion in an Advisory Circular.

Bird netting

Small gauge netting is an ideal material for permanent exclusion of birds from buildings and overhangs that are attractive for nesting and roosting. Although this method of control can be expensive, the target bird species is permanently excluded from the area. This type of installation has proven to be very effective in preventing birds from nesting in the eaves of many buildings located around PDX. The results of the risk evaluation will help to prioritize these projects and address expense related issues.

The airfield at PDX has some water features that are necessary for stormwater detention or retention that can attract wildlife. Two of these ponds have been covered with netting structures that reduce their attraction to birds. The Port will continue to install netting structures over ponds that attract birds, as finances allow. In addition, some of the existing netting structures do not effectively keep birds out of the ponds because the netting does not go all the way to the ground, which allows some birds to walk under the net to access the water. These structures will be modified with a net skirt around the bottom.

Bird Balls®

Most conventional wildlife management approaches exclude wildlife from accessing stormwater detention & retention ponds. Bird Balls® are used to hide the visual attractant feature as they float on top of the surface. This approach decreases the circling of waterfowl over the ponds as they investigate the feature. Aerial views of ponds treated with Bird Balls® appear as hard surfaces similar to parking lots. The balls are 4 inches in diameter and made of UV stabilized black hollow high density polyethylene. They are injected with 120 grams of water to decrease the chances of FOD during high wind events. In standard conditions the balls should provide 10 years of continuous service. This approach has been implemented in the Boeing retention pond located at the south end of runway 3/21.

Anti-perch devices

Airfield signs, posts, navigation aids and other structures provide attractive perch posts for birds in close proximity to runways and taxiways. Anti-perching devices mounted on these structures can be an effective way of deterring use of these perch posts by birds. In addition, PDX has retrofitted existing signs, poles, lights, and navigational aids within the Primary Zone that regularly support perching by red-tailed hawks and other bird species of concern with anti-perching devices.

5.2.6. Wildlife Food Source Management

Rodents, rabbits, earthworms, insects and other invertebrates are a highly attractive food source for many wildlife species of concern identified at PDX. In addition, trash, handouts and scattered refuse also provide a food source for some wildlife species of concern (e.g., gulls). Therefore, managing the availability of these food sources is essential in reducing the relative attractiveness of PDX to wildlife species of concern.

Wildlife food source management at PDX is primarily an action targeted at the Primary Zone due to its proximity to the airfield. Whenever wildlife food sources in the Primary Zone are documented to attract wildlife species of concern, a risk evaluation will be conducted to inform future decisions regarding appropriate actions to eliminate or minimize the hazard. Options could range from increased hazing or trapping of wildlife species of concern until the availability of the food source naturally declines, to the physical removal of the attractive food source, or to the implementation of proactive control measures to reduce the abundance or attractiveness of the food source.

At times, wildlife food sources located in the Intermediate of Secondary Zones may contribute to the increased presence of wildlife species of concern in the Primary Zone. For example, attractive food sources in the Intermediate or Secondary Zones may result in regular flyovers of the airfield by bird species of concern as they move between food sources and other important components of their home range (e.g., roosts, nest sites, other feeding areas). Whenever these circumstances are documented, the risk evaluation process will be employed to evaluate the level of risk posed to safe aircraft operations and guide management decisions. Such a process must, by necessity, include the influence of adjacent non-Port owned properties in the evaluation. If

warranted, actions similar to those proposed for the Primary Zone could be taken to reduce or eliminate food source hazards on Port-owned lands in the Intermediate Zone.

Insects

Insects are an important food source for many species of wildlife. Whenever insect abundance is unusually high because of climatic conditions, reproductive cycles or other events, wildlife species of concern may congregate to exploit this food resource. For example, American kestrels have been observed to target the grasshopper hatch at PDX during late summer. Insect populations within the Primary Zone should be monitored periodically by Airfield Maintenance and the Wildlife Manager to determine if insect abundance is acting as an attractant to wildlife species of concern. The Federal and State Agricultural Departments can help select appropriate control methods for insects, consistent with the Port's risk analysis, should this action be deemed necessary.

In response to a growing population of grasshoppers on the airfield the Port initiated a grasshopper control program in 2008. The insecticides used to date have been Sevin 5 bait (carbaryl) and Dimilin. Dimilin is used before they are adults and inhibits further growth and reproduction. Carbaryl has an immediate effect on both adults and juveniles but tends to be more expensive. Only certified pesticide applicators are allowed to apply these chemicals per the labels specifications. When using any insecticides at PDX there needs to be special attention to non-target species and other environmental concerns.

Earthworms

Earthworms are very attractive to bird species of concern at PDX when heavy rains bring large numbers of them to the surface. For example, red-tailed hawks have been documented through necropsy and field observations to feed extensively on earthworms at PDX during wet spring weather. Gulls also feed opportunistically on earthworms when available. The extent and severity of this problem at PDX is not yet known. Consequently, surface numbers of earthworms in the Primary Zone are monitored by Operations Department personnel, especially following periods of heavy rain. If earthworms are determined to be an unacceptable attractant of wildlife species of concern, then an appropriate pesticide could be applied to reduce population abundance. Again, the State Agricultural Department or Extension Agent can help select an appropriate pesticide for control, consistent with the Port's risk analysis.

Rodents and Rabbits

Gray-tailed voles and cottontail rabbits appear to be primary attractants of red-tailed hawks, herons, and other predatory wildlife species of concern at PDX. The primary means for population control of rodents and rabbits at PDX is the removal or modification of the habitat that supports their populations. These control measures are focused within the Primary Zone as a means of controlling the hunting behavior of predators that feed upon this source of food.

Rabbits are excluded from the airfield through the use of buried fencing, and the removal of shrub patches and brush piles. Rodents are also controlled by the removal of dense

brush, as well as the application of commercially available rodenticides on an annual basis.

The Port annually controls gray-tailed voles and other rodent populations within the fenced perimeter of PDX using the rodenticide zinc phosphide. The rodenticide is broadcast as grain bait laced with 2% zinc phosphide at a rate of 6 pounds per acre, usually in late summer. Zinc phosphide is highly toxic to birds and mammals, reacting with moisture and acid in the gastrointestinal tract of poisoned animals to produce deadly phosphine gas (Johnson and Fagerstone 1994). Death usually results from asphyxia. Both primary and secondary poisoning of non-target species may occur through either the consumption of treated baits or from consumption of poisoned animals (Johnson and Fagerstone 1994). Since zinc phosphide does not accumulate in a significant manner in the tissue of poisoned animals, secondary toxicity results from any remaining undigested bait in the gastrointestinal tract of individual prey. Following the distribution of laced bait, the Port intensifies its dawn-to-dusk wildlife hazing efforts for a time period sufficient for the chemical degradation of zinc phosphide (about 1 month). This effort minimizes the potential poisoning risk to non-target species, such as raptors, from the rodent control.

In 2003, the USDA/APHIS Wildlife Services evaluated the rodent situation at PDX, and provided some preliminary recommendation on control of gray-tailed voles (Witmer 2003). The approximately 750 acres of mowed grass that lies within the fenced perimeter portion of the Primary Zone provides habitat for gray-tailed voles, as well as the substantial acreage grass habitat within the Secondary Zone around PDX. The mild, year-around weather and relatively lush vegetation (food) at PDX may allow vole populations to remain at relatively high densities with a less pronounced cyclic fluctuation. Natural predation pressures on the population are presumed to be very low because of the hazing and relocation of potential vole predators and because of the perimeter fence. Even when vole populations crash, those that survive probably quickly reproduce and re-invade formerly occupied areas.

Gray-tailed voles are particularly difficult to trap, and there are no easy or long-term solutions for population control. Usually, an integrated control strategy using multiple methods works best (trapping, poisoning, habitat modification, exclusion). Some recommendations suggested by Witmer (2003) include:

1. Develop and implement an effective rodent monitoring protocol for use inside and outside of the perimeter fence. Monitoring the population will allow pro-active population management actions as well as providing important information on the vole population (i.e., do they breed throughout the year, how rapid is reinvasion, and how far and quickly are animals dispersing).

2. Trap placement suggestions: place live traps back-to-back in active runways; placing snap traps perpendicular across active runways so that the baited treadle straddles the runway; and place snap traps at the entrances to active burrow openings (where fresh digging has occurred).

3. Traps should be placed level on the ground so that they will not tip or move when a rodent places a paw on the trap.

4. Identify "colony areas" (a clustering of burrows and runways) with major runways radiating out from those areas as particularly good areas to hand bait or to place "permanent" bait stations.

5. Develop an effective rodenticide program to reduce vole numbers. Broadcast baiting with zinc phosphide (ZP; 2% on oats or wheat) usually works well with voles (and other small rodents). It should be applied early in the year when succulent vegetation for foraging is less abundant and voles are more vulnerable. Pre-baiting with "clean" oats (or wheat) to get good bait acceptance and to avoid the development of "bait shyness" (whereby rodents don't consume a lethal dose, become sick, and won't touch the bait again).

6. In the event that broadcast baiting with zinc phosphide is ineffective, consider testing a pelleted anticoagulant bait (chlorophacinone, diphacinone). Rodents don't become bait shy when anticoagulants are used, but there are greater secondary hazards because the compounds do bio-accumulate.

7. Continue the aggressive bird hazing program whenever rodenticides are used to reduce the primary hazard to non-target birds.

8. Consider placing a rodent barrier along the security perimeter fence to prevent or slow rodent reinvasion following control efforts within the fence. This could be done using metal flashing that extends about 10 inches above ground and below ground.

9. Consider a band of inhospitable habitat extending out perhaps 10 yards from the perimeter fence to slow rodent reinvasion following control efforts within the fence. This could be accomplished by digging a shallow trench and filling it with pea-sized (or somewhat larger) gravel.

Trash and Debris

Trash and debris around the terminal and at viewpoint areas are often responsible for attracting wildlife species of concern such as European starlings and gulls that scavenge on debris. Trash collection at PDX is conducted weekly so as not to allow the refuse containers to overflow and become an attractant. Whenever a specific area in the Primary Zone or Port-owned lands in the Intermediate Zone is identified as overly attractive to wildlife species of concern, additional monitoring of the site by Wildlife staff will be conducted to determine the source of the attractiveness and the risk posed. If the attractant is linked to trash and debris, corrective measures to reduce the refuse will be instituted. These could include increasing the frequency of trash collection, adding additional or modified trash receptacles, and/or signage to educate the public on the importance of proper trash disposal in these areas.

Food Handouts

Members of the public and airport employees are discouraged from feeding wildlife at PDX. If a situation develops where animals are given handouts of food, the problem will be discussed with the person(s) involved so that it can be discontinued. A problem was

recently identified where taxi drivers were feeding birds while in the Ground Transportation Office holding lot waiting to access the commercial roadway in front of the passenger terminal. A pamphlet was prepared for distribution by the Ground Transportation Office to the taxi drivers informing them of the prohibition of and the potential hazards associated with feeding wildlife at the airport. Similar educational material will be distributed to other individuals or groups that violate this prohibition.

Where necessary, signs will be posted to educate the public on the association between feeding animals and creating wildlife hazards at the airport, and asking that individuals refrain from feeding any wildlife near the airport. Signs such as these were used successfully at the public viewing area along Marine Drive before it was closed for security reasons in September 2001.

Pesticides

Only those pesticides registered through the EPA and the Oregon Department of Environmental Quality (DEQ) are considered for usage at PDX. These registered pesticides are available through private pesticide companies, the State Agriculture Office or USDA Animal Damage Control. Pesticides are used for a variety of reasons such as weed, insect, earthworm and rodent control. Pesticides kept on hand are limited by shelf life and are ordered on an as-needed basis. Insect and rodent control in and around airport buildings may be contracted to outside companies with licensed applicators. All legal requirements for pesticide storage, handling and application will be followed.

5.3. Research and Development

The Port has evaluated numerous types of techniques and equipment, and has field-tested a variety of habitat modifications to control wildlife at PDX since the 1998 inception of this WHMP. As future non-lethal or non-toxic control measures are developed, PDX will evaluate these on an individual basis for cost and effectiveness. Knowledge obtained from the Port's risk analysis is used to inform and prioritize decisions on control options. Those cost-effective methods that achieve positive control effects, without harming wildlife or the environment, will be considered for incorporation into future updates of this plan. Information gained from research and development projects will be applied to inform the full range of wildlife hazard management strategies at PDX, as appropriate.

Control measures and devices currently in the research and development stage will be evaluated for implementation at such time they become commercially licensed and available, or are proven effective during field trials at PDX. Examples of ongoing field trials at PDX include alternative vegetative cover, effective bird perching deterrents and auditory wildlife dispersants (e.g., high frequency sounds, wildlife distress calls, high intensity sounds, the green laser). Other future control options could include alternatives to grass cover on Port-owned lands to reduce rodent populations that attract foraging raptors, great blue herons and other wildlife species of concern (e.g., paving, grass-crete, artificial turf, shrub cover) and new hazing devices (e.g., pyrotechnics, bean bag launchers, laser guns), among others.

5.4. WHMP Information and Education

5.4.1. Internal Port Communication

The success of the Wildlife Hazard Management program depends on the support of a variety of internal Port departments, teams, and individuals. Some of the departments with identified roles have been outlined in Section 3.0, including the interaction between the Aviation Natural Resource Manager and /or the Aviation Wildlife Manager and other Port program managers. Wildlife staff at PDX have frequent interaction with staff from these departments on many levels.

In addition to this, there are many ways in which the issues of the WHMP are communicated to the larger Port audience. Briefings are provided to departmental staff meetings as needed. Presentations are made to Manager's Forums, project management teams, senior Aviation management, the Aviation Task Force, the Directors, as well as the Port Commission. New employees are given an overview of the program by a Wildlife staff member on their initial Port tour. Members of various departments are encouraged to ride along with Wildlife staff to see the program first hand, as appropriate. Displays are set up in Port facilities to illustrate WHMP issues. Internal publications, such as "Currents," "PDXaminer" and "Portsmouth" are communication tools that provide updates on specific projects or milestones of the program. Port employees even learn about the program when they bring their children to "Bring your Child to Work Day" or at interactive displays set up for special occasions.

Departments who work closely with Wildlife staff have been involved in a series of "chartering" meetings to secure endorsement for the program and to identify areas of program overlap. This process has helped to clarify roles and avoid duplication of efforts.

The WHMP is greatly assisted by Port staff who learn about the program, remain current on the issues, and who can connect their specific job function to areas of interaction with the Wildlife Hazard Management program at PDX.

5.4.2. External Audiences

Regulatory Agencies

There is a large group of regulatory agencies that interact with the WHMP, whether to formally certify the plan, issue permits, or to give advice or feedback. In addition, the Port makes every effort to interact with the regulatory agencies in other forums, to understand the larger context of the WHMP issues and to build positive relationships with agency members.

The Wildlife Advisory Committee is a group that was started in 1996 by the Port and is chaired by the Wildlife Manager. The purpose of this committee is to provide a forum to discuss the WHMP with regulatory agencies, interest groups, and the public. This committee meets at least twice a year, and provides ongoing feedback and expertise to the WHMP, as well as serving as a sounding board for wildlife hazard management at PDX. This committee also helps wildlife staff to establish relationships with agency

representatives, which facilitates the sharing of information, the process of obtaining permits, and an understanding of the larger context of the WHMP.

The Airline Advisory Committee is another Port-hosted group that provides feedback to the WHMP. This group of airline representatives gives Wildlife staff the airline perspective, and can be used to disseminate information about the program and their role in providing data if they are involved in wildlife incidents at PDX.

Besides the Port-facilitated Advisory Committees, members of the Wildlife Hazard Management program at PDX participate in other forums with regulatory agencies. The "Living with Urban Wildlife" symposium series, hosted by the Audubon Society of Portland, is one a forum that puts the WHMP into a larger regional context and facilitates informational sharing. Advisory committees for educational facilities are another forum for Port staff to interact with agency representatives and learn of research going on at colleges nearby.

In addition, Port wildlife staff are encouraged to participate professionally in public educational programs, seminars, workshops, and field programs.

When new issues arise with the WHMP, members of regulatory agencies are invited to take a field tour with Wildlife staff so they can see the issue first hand and provide their perspective. This allows Port staff to receive advice, and agency representatives to understand current WHMP issues.

Adjacent Landowners

The Port recognizes that adjacent landowners can have an effect on the Wildlife Hazard Management program, either positive or negative. How the land is used and what attractants are present there, will affect the species of wildlife that are found in and around the airfield. In addition, any wildlife management practices employed on adjacent properties can push wildlife toward PDX.

The Port meets with adjacent landowners, like Golf Course managers, whenever concerns arise about wildlife management practices that may exacerbate the strike hazard at PDX. Private land owners may be contacted if they have an attractant of concern on their property.

If land use practices are proposed for adjacent lands that are in conflict with safe aircraft operations, as outlined in FAA AC 150/5200-33, the Port will meet with the property owner to recommend that the proposed land use change not occur. If necessary, the Port will ask the FAA to support these efforts.

The Oregon Department of Aviation, Board of Aeronautics, is an active member of the Wildlife Advisory Committee. This allows the Port to hear of proposed land use changes that may be in conflict with safe aircraft operations, such as the location of wetland mitigation sites or wastewater treatment plants. In addition, the Port's Planning and Development and Aviation Planning departments are often involved in land use decisions, and will coordinate with the Aviation Natural Resource Manager to ensure that

no new wildlife attractants are planned for adjacent properties, whether they are Port-owned or privately owned.

The Conditional Use Master Plan is another process that the Port participates in that provides a legal definition and constraint over land uses. This process can benefit the Wildlife Hazard Management program by allowing only those land uses that are not in conflict with safe aircraft operations.

General Public

There is a strong interest in wildlife issues in Portland and in the Pacific Northwest. The Port promotes opportunities to provide the public with consistent messages and accurate information about the WHMP. This is done through the Port's Public Affairs Department. Public Affairs looks for opportunities to disseminate information to the public, and also responds to requests from the media for information.

The Port's public web site, www.portofportland.com, also has a web page to give an overview of the program and provide an update on current issues.

The Port participates in many public outreach opportunities, such as having a booth at an Earth Day fair, that provide the public with an overview of the Wildlife Hazard Management program at PDX. Wildlife staff use these opportunities to discuss the program with the public and provide consistent messages.

Transfer of Technology

Some of the technology used for airport wildlife management is very specific to the industry. The Wildlife Manager has developed a strong network of contacts at other airports that share information about their programs, equipment, and techniques. The Port actively disseminates information and technology gained through implementation of the PDX Wildlife Habitat Management program with the aviation/bird strike community and other interested parties through ongoing dialogue, professional conferences, newsletters and other appropriate avenues.

Many of these contacts have been established through meetings of the Bird Strike Committee USA / Canada, the International Bird Strike Committee, and the American Association of Airport Executives. Members of the Port Wildlife staff will continue to attend these conferences to expand their network of airports, researchers, vendors, and experts in the field.

The Port has also taken advantage of opportunities to host conferences or technical training sessions that facilitate meaningful dialog with federal and state wildlife management agencies. Wildlife staff are also encouraged to participate in inter-agency training opportunities, like the Vertebrate Pest Control Seminar, or the "West Nile Virus Workshop."

The Port subscribes to a variety of journals and newsletters to receive current information about wildlife control at airports.

Some of the technology that can be used for wildlife management comes from other industries, such as agriculture, wineries, mining, or other sectors that are concerned about problem wildlife control. The Port utilizes the Internet, professional publications, and local contacts to hear about new technology or techniques used by other industries to control problem wildlife in other industries.

6 WILDLIFE STAFF TRAINING REQUIREMENTS [14 CFR 139.337f (7)]

There are many training requirements before a Wildlife Technician is ready to work independently on the airfield at PDX. In cooperation with Airside Operations, the Wildlife Hazard Management program has developed its own training program, which relies on other Port Departments and cooperating agencies for support (e.g., FAA Air Traffic Control Tower, Port Police). Wildlife Technicians must demonstrate competency on the items listed in Table 3 before their training period is complete. Training records are maintained by the Wildlife Manager and are subject to review by the FAA regional certification inspector during the annual Part 139 certification inspection.

Table 3. Wildlife Hazard Management program training requirements

Topic	Trainer
Wildlife Regulations and Laws	Port Staff
Airport Security Badge	Security Badging Office
Airfield Familiarization and Safety	Wildlife Manager
Airfield Movement Area Access	Airside Operations
Coordination with FAA ATC / Radio Protocols	Airside Operations
Firearms Safety, Use, and Cleaning	Port Police
Handling and Transporting Injured Wildlife	Audubon Society of Portland
Euthanasia Principles	Audubon Society of Portland
Wildlife Control Equipment and Procedures (shotgun, starter pistol, cannons, live traps, noose pole, paintball marker)	Wildlife Manager or Wildlife Technicians
FAA Codes Regulating Wildlife Control at Airports	Wildlife Manager
Protocol for Starling Trapping	Wildlife Manager or Wildlife Technician
AIRMAN Database Procedures and Protocols	Natural Resource Technician or Wildlife

	Manager
Vehicle: Equipment, Cleaning, Fueling and Maintenance	Wildlife Manager or Wildlife Technician
Bird Identification	College level course.
Aircraft Identification	Wildlife Manager or Airside Operations
Raptor Trapping and Relocation Project Overview	Pacific Habitat Services
Overview of Species of Concern and Strike History for PDX	Wildlife Manager

Additional training opportunities will be required as new projects, issues, or equipment is started. Refresher training and recurrent training

Training is essential for all personnel involved in the Wildlife Hazard Management Plan. This training will provide airport personnel with the knowledge and skills needed to carry out the WHMP. The Wildlife Manager maintains and submits wildlife staff training records to the FAA during the Annual Certification Inspections.

6.1. Awareness Training

The Wildlife Manager will provide general awareness training of wildlife issues to airport and airfield personnel as appropriate. This training will include identifying wildlife hazards and reporting them to the Port's Wildlife staff.

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Witmer 2003

APPENDIX A Wildlife Risk Evaluation Model

APPENDIX B Generalized Use of PDX by Red-tailed Hawk

APPENDIX C 14 CFR § 139.337.Certification of Operations: Land Airports Serving Certain Carriers. Wildlife Hazard Management

APPENDIX D FAA Advisory Circular 150/5200-33. Hazardous Wildlife Attractants On or Near Airports

APPENDIX E PDX Wildlife Control Permits

APPENDIX F Management Actions and Tracking Table

APPENDIX G Avian Point Count Protocol

APPENDIX H PIA Instruction 91-212. Bird Aircraft Strike Hazard (BASH) Bird Hazing Procedures on the Oregon Air National Guard Base Property

APPENDIX I Lethal Action Record

Appendix J List of Approved PDX Plants

Appendix K PDX Plant List Variance Request Form

Appendix L PDX Wildlife Deterrent Fencing