Portland International Airport

Wildlife Hazard Management Plan

April 2019

Submitted by:
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Per AC 150/5200-36A

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Plan Approval

The Portland International Airport developed this Wildlife Hazard Management Plan under the direction of Nick Atwell, a Qualified Airport Wildlife Biologist as stipulated in FAA Advisory Circular 150/5200-36A. The following Wildlife Hazard Management Plan for Portland International Airport has been reviewed and approved by the Airport Operations Manager and the Federal Aviation Administration. This plan will become effective on the signature date.

Phil Stenstrom		3-21-2019
Airport Operations Manager (Printed Name)	Signature	Date
Charlotte Jones	Charlotte Jones	28 Jun 19
Federal Aviation Administration (Printed Name)	Signature	Date

FEDERAL AVIATION ADMINISTRATION

JUN 28 2019

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Airport Certification Manual Reference

The PDX Wildlife Hazard Management Program is implemented by delegation of authority under the PDX Airport Certification Manual (ACM).

The Port of Portland completed a Wildlife Hazard Management Plan (WHMP) for Portland International Airport (PDX) in 1998 to comply with 14 CFR Part 139.337. The WHMP was subsequently updated in 2004 and again in 2009 to 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. This 2019 update addresses revised Federal Aviation Administration (FAA) regulations, integrates risk assessment information and includes program changes and editorial corrections instituted since 2009. 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 & Maintenance and are hereby incorporated by reference into the 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.

FEDERAL AVIATION ADMINISTRATION

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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

ATCT – Air Traffic Control Tower

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

EIS Environmental Impact Statement

EMS – Environmental management system

EP – Environmental Protection Zone

EPA – U.S. Environmental Protection Agency

ESA Endangered Species Act

FAA – Federal Aviation Administration

FAR – Federal Aviation Regulations

FOD – Foreign Object or Debris

FONSI – Finding of No Significant Impact

HCP Habitat Conservation Plan

IAW – Air Force Instruction

ITP Incidental Take Permit

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

OR ANG – Oregon Air National Guard

ORS – Oregon Revised Statues

PDX – Portland International Airport

PIA – Portland International Airport (OR ANG reference to PDX)

PIC – Portland International Center

Port – Portland of Portland

RPZ – Runway Protection Zone

SHLA Streaked Horned Lark

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

WDFW – Washington Department of Fish and Wildlife

WHMP – Wildlife Hazard Management Plan

WIS – Wildlife Information System

EXECUTIVE SUMMARY

PORTLAND INTERNATIONAL AIRPORT WILDLIFE HAZARD MANAGEMENT PLAN 2019

1.0 INTRODUCTION

The first Wildlife Hazard Management Plan (WHMP) was developed in 1998 for Portland International Airport (PDX) in response to identified wildlife hazards on and around the airfield. Since the initial WHMP was developed, it has been revised over the years to reflect changes in program organization, administration, and implementation. This 2019 version of the plan addresses revised regulations, incorporates other changes made within the program, and includes editorial corrections from the previous version. A table of revisions from 2009 to 2019 is included as Appendix A.

Nationally, wildlife present hazards to safe aircraft operations and, in rare cases, have caused catastrophic events resulting in the loss of human lives. Although the potential for this type of event is very low, the concern is very real. Additionally, wildlife strikes can cause damage to aircraft and impact airport operations, which cost the industry hundreds of millions of dollars, and hundreds of thousands of hours of aircraft down time every year. The Federal Aviation Administration (FAA) recognizes these potential hazards and directs FAA regulated airports that experience one or more triggering events to perform a Wildlife Hazard Assessment (WHA) and possibly develop/implement a WHMP in accordance with 14 CFR Part 139.337. The triggering events are as follows:

(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.

Prior to the development of the WHMP, the Port of Portland (Port) completed an initial WHA in 1996 to establish baseline information on wildlife and habitats at PDX. Pacific Habitat Services completed a second WHA in 2001 preparatory to the drafting of the revised PDX WHMP in 2002-03. A third WHA and WHMP was prepared by Jones & Stokes in 2003 and 2004. Since then, PDX Wildlife Staff continue to document wildlife presence and behavior on and around the airfield as an ongoing hazard assessment to guide management actions. This collection of data provides a way to track wildlife strikes and establish a list of wildlife species of concern as well as the most used attractants on and around the airfield.

This plan satisfies the requirements set forth in FAA 14 CFR 139.337 and is reviewed at least annually, or whenever an air carrier aircraft experiences a triggering event that would warrant an additional review. This review/revision protocol will ensure that the WHMP stays current and responsive to changing conditions, and incorporates the principles of adaptive management. An annual report is prepared and submitted to the

FAA to inform the annual Part 139 certification inspection, and serves as an annual program review and ongoing WHA. A checklist of the FAA requirements that this plan includes is provided, along with where each item can be found in the plan.

2.0 PROGRAM ORGANIZATION, ROLES AND RESPONSIBILITIES

This chapter details the organizational structure of the Wildlife Hazard Management Program and the roles and responsibilities of those individuals with a direct role in its implementation. The Wildlife Hazard Management Program exists within the Port's Environmental Operations Department and has many points of interaction with other internal and external stakeholders. The Port's Chief Operating Officer retains the ultimate decision-making authority for major program decisions. The Aviation Wildlife Manager directs personnel and activities related to wildlife hazard management and reports to the Sr. Natural Resources Manager and the Environmental Operations Director.

The Port recognizes that the cooperation of many departments both inside, and outside, of the Port is necessary for the successful implementation of the WHMP. This chapter also includes a detailed description of the roles and responsibilities of the Ports Airport Operations, Maintenance, Media Relations, and Legal Administration departments, along with the OR ANG 142nd Fighter Wing.

3.0 WILDLIFE MANAGEMENT STRATEGIES

Chapter 3 details the risk evaluation process and model developed by the Port to determine which wildlife species are of the most concern to aviation safety. Data for the model is obtained from two sources: the United States National Strike Database and documented PDX wildlife data. National Strike data is used for determining the severity of impact while the local PDX wildlife data is used to determine a species probability of occurrence. Using both datasets, each species is assigned a risk category for both their potential severity of impact as well as their probability of occurrence. The results of the risk model are implemented based on the varying management areas on and around PDX. Using a tiered approach, the Port has established three separate zones within the FAA's 10,000-foot separation distance. These zones are the Primary Zone, Secondary Zone, and FAA Separation Zone and are used to prioritize management objectives. Within the zones are 11 distinct management areas and associated sub-areas which are used to address the unique aviation wildlife hazards on and around PDX.

Strategies employed in the three zones are organized around four management pillars that support the Wildlife Hazard Management Program: (1) short-term operational strategies, (2) long-term management strategies, (3) research and development projects, and (4) information and education programs. These program components are interconnected by lateral paths representing information and technology transfer.

The first pillar, short-term operational strategies, primarily addresses the needs of the moment and includes the reactive hazing program intended to clear the critical airspace for imminent aircraft operations. Some short-term habitat modifications may be included in this pillar, but they will be on a relatively small scale. Habitat modifications, such as wetland removal and site conversions fall under the second pillar, long-term management strategies. The third pillar involves research and development and is

focused on investigating current and proprietary wildlife control options. Lastly, the information and education component of the fourth pillar strives to facilitate an exchange of ideas and information for both internal and external entities.

The four pillars are all involved in the general operational strategies employed by the Port. For all wildlife management issues, PDX Wildlife Staff use a hierarchy of wildlife control to guide decisions. This process starts with the least aggressive techniques/tools and leads up to the most aggressive. Depending on the situation, short-term and/or long-term approaches may be implemented.

While general operational strategies deal with situations as they emerge, project evaluations and screenings are implemented in order to proactively ensure future actions do not adversely affect safe airport operations. For development activities located within the FAA 10,000-foot separation distance, early concepts and designs of projects are channeled through the Aviation Wildlife Manager to ensure compatible land use planning.

Encompassing the four pillars and general operational strategies is an adaptive management practice. This approach is built into the PDX Wildlife Hazard Management Program in order to monitor, evaluate and adapt to the ever changing environmental and ecological systems encountered. Adaptive management gives the Port the flexibility to deal with unanticipated events and unique circumstances as well as increase the effectiveness of the program.

Chapter 3 concludes with a discussion of habitat modification and other long-term management strategies applied at PDX 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. Risk management procedures employed to immediately discourage, disperse and remove wildlife species of concern from high risk areas on the airfield are discussed in Chapter 6.

4.0 APPLICABLE LAWS, REGULATIONS, POLICIES AND PERMITS

Chapter 4 identifies the major federal, state, and local mandates that define the legal context of compliance within which the WHMP must operate. The first section explains FAA grant assurances and how they dictate compliance with numerous federal laws and regulations, including FAA Advisory Circulars (AC). Included in this section is information regarding FAA airport certification regulations and FAA AC 150-5200-33B, which specifically addresses wildlife attractants on or near airports. Since the Port receives FAA grant assurances, Section 4.2 describes the Environmental Assessment (EA) that was completed in order to comply with the National Environmental Policy Act (NEPA).

Following NEPA, Chapter 4 addresses several federal, state, and local regulations associated with PDX and the WHMP. Also included is a listing of the federal, state and local permits that are required for implementation of wildlife control activities at PDX. At

the local level, Chapter 4 includes the Airport Plant List which dictates landscaping standards within the Portland International Airport Plan District. The Airport Plan District is included in the City of Portland's zoning codes and gives the Port flexibility in addressing various changing impacts such as transportation and aviation wildlife hazards on and around the airfield.

The final section of this chapter pertains to the Port's missions, goals and policies. The WHMP supports and is guided by the stated missions of the Port. While the priority of the Wildlife Hazard Management Program at PDX is aviation safety, the Port strives to achieve this goal through responsible environmental stewardship.

5.0 RESOURCES TO IMPLEMENT THE PLAN

Chapter 5 identifies those resources needed to support implementation of the WHMP, including equipment and supplies maintained on-site and vehicles used for airfield patrols.

6.0 RISK MANAGEMENT PROCEDURES

The risk management procedures detailed in Chapter 6 define the full range of day-to-day operational tactics and management strategies designed to increase public safety by reducing the incidence of wildlife-aircraft collisions at PDX. Together with the long-term habitat modification strategies presented in Chapter 3, these represent the toolbox of acceptable techniques available to Wildlife Staff to mitigate wildlife hazards. Because the 2019 WHMP serves as the foundation for future 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.

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.

7.0 MONITORING, EVALUATION AND REPORTING

The PDX Wildlife Hazard Management Program collects and maintains data on wildlife occurrence, wildlife-aviation strikes, and wildlife hazard management activities undertaken on the airport and surrounding environs. Chapter 7 describes the data collection process, and how this information is used to identify patterns in hazardous wildlife presence and determine the effectiveness of WHMP measures at resolving wildlife-aviation conflicts. Any new actions proposed are reviewed to ensure they would not inadvertently create new hazardous wildlife attractants. Wildlife hazards listed in the WHMP or observed around the airport are re-evaluated annually. If wildlife-aviation risk changes over time, the causes are examined and the WHMP updated as warranted. A review of the WHMP is conducted annually, with the results submitted to the FAA. This annual report serves as an ongoing WHA program review.

8.0 WILDLIFE STAFF TRAINING REQUIREMENTS

Chapter 8 presents training requirements that have been identified collaboratively with the Airfield Operations Department, the FAA Air Traffic Control Tower, Port Police, and Wildlife Staff. Included is this section is a listing the required training topics and the designated trainer. As new training needs are identified it is expected that this chapter will expand to meet those needs.

9.0 LITERATURE CITED

Chapter 9 presents the literature citations referenced in the text of the WHMP.

APPENDICES

The Appendices contain pertinent supporting documentation to the WHMP.

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1 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 2004, and again in 2009, to address significant changes in program organization, administration, and implementation. This 2019 update to the WHMP addresses revised Federal Aviation Administration (FAA) regulations, incorporates the findings of the Port's wildlife risk assessment process, accounts for changes to the WHMP initiated since 2009, and includes minor editorial corrections from the 2009 version. This 2019 update supersedes the 2009 version 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 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 and around PDX.

1.1.1. National Perspective

Nationwide, wildlife can present a variety of problems that affect operations at airports. Between 1990 and 2015, 166,276 wildlife strikes involving civil aircraft were reported to the FAA (Dolbeer et al. 2016). Some of these wildlife strikes have caused catastrophic events that involved the loss of human lives. Although the potential for this type of incident is low, the concern is, nonetheless, very real. In addition to the danger posed by wildlife strikes, they have negative effects on airport operations. Six percent of aircraft-bird strikes and twenty percent of aircraft-mammal strikes reported from 1990 to 2015 resulted in damage to aircraft or some other related cost (Dolbeer et al. 2016). The FAA reports that at a minimum, wildlife-aircraft strikes cost the USA civil aviation industry 949,768 hours of aircraft down time, and $649.3 million in monetary losses every year (Dolbeer et al. 2016).

1.1.2. Local Perspective

PDX, owned and operated by the Port of Portland, is the 30th 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 20 airlines to 63 domestic cities and 10 international destinations. The airport averaged 260 daily scheduled commercial aircraft operations and assisted 19,080,494 passengers in 2017. 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 (OR ANG). Operations (landing and departures) by commercial, general aviation and military entities totaled 228,949 in 2017 (Portland International Airport Monthly Traffic Report, 2017).

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. The Peninsula Slough, a tributary to the Columbia Slough, lies immediately west of PDX. Land uses surrounding PDX include 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) airfield turf, asphalt/concrete runways, taxiways, roadways, and buildings associated with the airport terminal and other airport and airline operations (Figure 2). An 8-foot high security fence surrounds the entire airfield. Three runways lie within the airfield:

- Runway 10L/28R is 9,825 feet long and 150 feet wide
- Runway 10R/28L is 11,000 feet long and 150 feet wide; and
- Runway 3/21 is 6,000 feet long and 150 feet wide

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 areas increase, the airport, adjacent golf courses, and undeveloped properties show greater use by resident and migratory wildlife seeking the remaining expanses of suitable habitat. In 2017, Port monitoring data recorded a monthly average of 45 different species of birds and six mammal species in the vicinity of the airport. Many of these species pose a potential hazard to aircraft when they occupy the same airspace used for aircraft operations.

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 2017, 1,417 bird strikes and 17 mammal 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 on and around the airport. 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 adequate wildlife control measures are in place;
- Any response to a wildlife threat is handled using the most appropriate and effective options available, and will be supported by the risk evaluation process developed by the Port (Appendix B);
- Lethal removal of wildlife is recognized as an important additional option when the threat to public safety is imminent and other methods have failed to address the issue.
- Regular reviews of proposed land use changes and proposed development in surrounding areas are vital in ensuring that adjacent land uses are compatible with airport operations.

The Port's Environmental Operations Department is responsible for the implementation of this program, under delegation of authority from the Airport Operations Administration Department, in accordance with the PDX Airport Certification Manual and 14 CFR Part 139.337. 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]

The initial Wildlife Hazard Assessment (WHA) for PDX was prepared by USDA APHIS in 1996. Pacific Habitat Services completed a second WHA in 2001 preparatory to the drafting of the revised PDX WHMP in 2002-03. A third WHA and WHMP was prepared by Jones & Stokes in 2003 and 2004. In these studies, 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 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 Port's Wildlife Information System (WIS) and is utilized to annually reassess and validate current wildlife hazards at PDX. The WIS provides a database where 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 7.1.1 for

more detail on WIS). An annual report is provided to the FAA during the annual Part 139 certification inspection as the airport's ongoing wildlife hazard assessment.

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 250 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.

In 2015, the FAA reported a record 13,795 wildlife strikes to civil aircraft. This increase in wildlife strikes is attributed to an increase in large bird populations, quieter modern aircraft, growth in the number of air traffic movements, and more strikes being reported that used to go undocumented. Nationally, approximately 71% of all bird-aircraft strikes with commercial aircraft occur below 500 feet above ground level (AGL), and 82% occur below 1,500 feet AGL. In addition, 71% of all damaging strikes occur below 1,500 feet AGL (Dolbeer et al. 2016).

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.

Between 2006 and 2015, 791 bird strikes and 10 mammal strikes were reported at PDX. Passerines (46%) were the most frequently struck group of birds, followed by raptors (33%), shorebirds (15%) and waterfowl (6%). Reported bird strikes have fluctuated over the last 10 years with an overall increase in the number of reports primarily 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, storm water 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 wildlife species of concern list is based upon wildlife observations and strike data collected at PDX between 2013 and 2017, 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 B).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 2017 update to the wildlife species of concern and monitor species list (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. 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 based on severity and/or probability.

Table 1. Current list of wildlife species of concern and monitor species for PDX based on the Risk Assessment Model and data from 01/01/13-12/31/17

Wildlife Species of Concern	Monitor Wildlife
American crow (450g) [a]	American coot (650g)
American wigeon (720g)	American kestrel (117g)
Canada goose (1,600-4,500g)	Bald eagle (4,325g)
Great blue heron (2,400g)	Barn owl (460g)
Gulls (420-1,400g)	Black-tailed deer (100-400lbs)
Mallard (1,100g)	Coyote (20-45lbs)
Northern pintail (800g)	Cedar waxwing (32g)
Osprey (1,600g)	European starling (82g)
Varied Thrush (78g)	Mourning Dove (120g)
Unidentified Species	Pigeon (270g)
	Short-eared owl (350g)
	Swallow Spp. (19g)
	Turkey vulture (1,830g)

[a] Average body mass (Sibley 2014)

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 on 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, storm water 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. As the surrounding area has increased in urban density, the airport, adjacent golf

courses, and undeveloped properties have experienced increased wildlife use as resident and migratory wildlife seek out the remaining areas of suitable habitat. 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 are the primary attractants of red-tailed hawks, great blue herons and other predatory wildlife species of concern (including coyotes) that hunt on 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. 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 storm water runoff create larger open water areas attractive to waterfowl and wading birds. 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 airfield turf that provides cover for rodents, the primary prey of predatory species. Vegetative cover on lands adjacent to PDX is heavily fragmented and ranges from tall grass in areas infrequently mowed 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[1] 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 2014.

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 storm water 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.

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 on and around PDX. Since 2002 the Wildlife Information System (WIS, formerly referred to as AIRMAN) contains approximately 17 million records of individuals comprised of 206 species of birds and 22 species of mammals. 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

[1] Defined as the 10,000 ft. separation distance, FAA AC 150/5200-33B (section 1-3).

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, osprey, and bald eagles. Six resident red-tail hawk pairs have home ranges that include some portion of 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.

Most wildlife observation data is collected with a focus on birds that are a potential hazard to aircraft and often include multiple records of the same individuals. In order to create an unbiased data set that can be used to inform management decisions, a weekly point count survey is completed by PDX Wildlife Staff. This survey data show population trends, species composition, and identifies which areas wildlife are most frequently observed on and around PDX. This information is also used in the annual report/ongoing wildlife hazard assessment.

1.3. WHMP Administration

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

Potential wildlife hazards at PDX are monitored daily. The WHMP is reviewed at least every 12 consecutive calendar months or whenever an air carrier aircraft experiences a triggering event such as 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. In addition, this report serves as the ongoing wildlife hazard assessment for PDX. See Section 7.3 for further details on WHMP review and reporting to the FAA. 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 and around PDX. Specific requirements on

what, at a minimum, shall be included in the WHMP are provided in 14 CFR 139.337(f). Below is a list of these requirements and the locations in this WHMP where each requirement is addressed.

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

1. A list of the individuals having authority and responsibility for implementing each aspect of the plan. [Section 2]

2. A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion: [Section 3 & Appendix C]

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 4]

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 [Section 2];

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 6];

iii. Wildlife hazard control measures [Section 6]; and

iv. Ways to communication effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower. [Section 6];

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: [Section 7]

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 8]

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

1.3.3. Oregon Air National Guard BASH Plan

PDX is a joint use facility and shares the airfield with the 142nd Fighter Wing of the Oregon Air National Guard (OR ANG). The OR ANG has developed a program in compliance with Air Force Instruction (AFI) 91-212 to minimize wildlife strikes at PDX called the Bird Aircraft Strike Hazard (BASH) plan. Instead of implementing two separate wildlife management strategies at PDX, the Port and the OR ANG have agreed to integrate the BASH plan into this WHMP. The Port Wildlife Staff has the primary responsibility of implementing all aviation wildlife management techniques at PDX and surrounding properties. The OR ANG BASH team also plays a role as outlined in the Roles & Responsibilities section of this WHMP (Section 2.4.2).

An operating instruction protocol has been developed for the hazing of wildlife within the perimeter of the OR ANG base by Port Wildlife Staff. Compliance with this protocol, detailed in AFI 91-212, is mandatory. In August 2008, the 142nd Fighter Wing's BASH plan was rewritten to supplement the PDX WHMP. Both the plans have been fully integrated since 2009. 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 with hazing wildlife on the OR ANG Base. The 142nd Fighter Wing's 2017BASH plan is presented in its entirety in Appendix E.

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Figure 1. Portland International Airport Vicinity Map

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Figure 2. Portland International Airport Facilities Map.

FEDERAL AVIATION ADMINISTRATION

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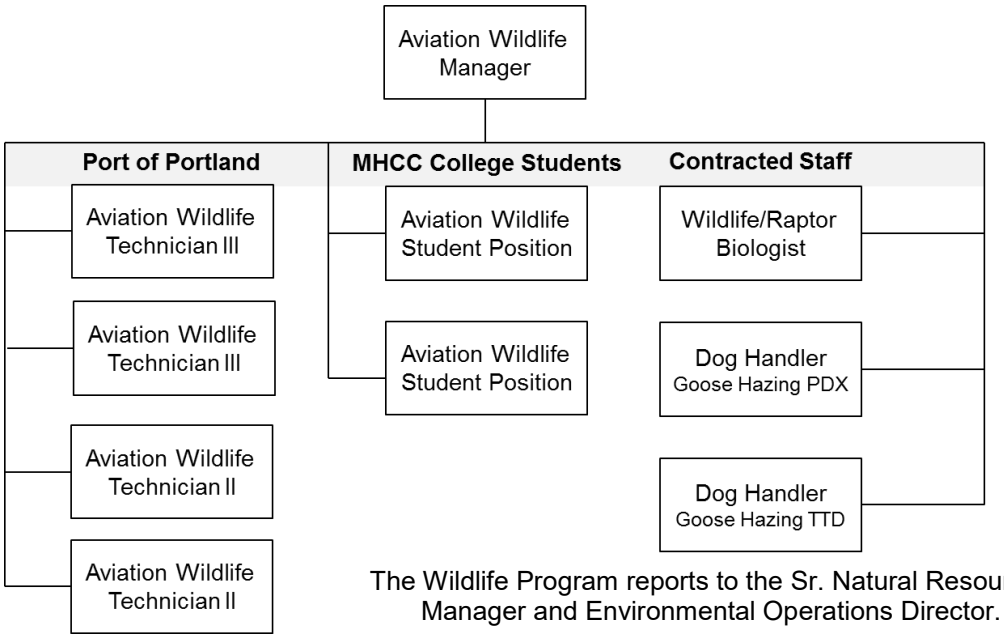
2 PROGRAM ORGANIZATION, ROLES AND RESPONSIBILITIES [14 CFR 139.337f (1)]

The Program Organization, Roles and Responsibilities chapter provides an overview of the Port's larger Wildlife Hazard Management Program. It also includes 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 the implementation of the WHMP.

2.1. Program Organization

The Wildlife Hazard Management Program exists within the Port's Environmental Operations Department which is responsible for the Port's activities related to natural resources. The Aviation Wildlife Manager directs personnel and activities related to wildlife hazard management and reports to the Sr. Natural Resources Manager and Environmental Operations Director (Figure 3). The Sr. Natural Resources Manager and Environmental Operations Director ultimately report to the Port's Chief Operating Officer.

Figure 3. Port Wildlife Management Program organization effective 01/01/2019.



2.2. Roles & Responsibilities of the Chief Operating Officer

The relevant responsibilities of the Chief Operating Officer 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.

2.3. Roles & Responsibilities of PDX Wildlife Staff

The following text provides an overview of the roles and responsibilities of Port staff involved in the PDX Wildlife Hazard Management Program. Additional detail regarding roles and responsibilities is documented within the Port's EMS work instructions.

2.3.1. Sr. Natural Resources Manager

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 Chief Operating Officer as appropriate.
- Authorize the budget for the Wildlife Hazard Management 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 Chief Operating Officer, Director of Environmental Operations 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.

2.3.2. Aviation Wildlife Manager

Program Operations and Maintenance:

- Supervise the PDX Wildlife Hazard Management Program Staff.
- Develop and implement annual work plans and budgets for the Wildlife Hazard Management Program.
- Work with planners, developers and other stakeholders to ensure compatible land use planning on and around the airport.

- Maintain FAA Airport Wildlife Biologist certification to conduct WHA's, write/update WHMP's and to train Aviation Wildlife Hazard Management staff

- 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 Inspection.

- Serve as an active member of the OR ANG 142nd FW Bird Hazard Working Group (BHWG). Provide assistance with BASH plan updates for program integration and oversee proper implementation.

- Will prepare and submit or validate all strike reports at PDX with the FAA.

- Serve as the subject matter 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 translocation 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 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.

- Serve as the Port's subject matter expert for ESA issues on aviation properties.

- 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. Conduct media briefings as requested.

- Address aviation wildlife concerns received from the media or the public.

- Keep the Chief Operating Officer, Director of Environmental Operations, 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 Environmental Managers.
- 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 Student Positions.
- Develop and present the Aviation Wildlife Hazard Training Module to the Airport Operations Supervisors.
- Train ORANG BASH team in the implementation of the PDX WHMP.
- Maintain an ongoing intensive hazing schedule. Maintain training records for annual Part 139 Certification inspection.

2.3.3. Wildlife Technicians

Program Operations:

- Respond immediately to alleviate any wildlife hazards observed or reported.
- Conduct physical inspections/patrols of the airfield to implement wildlife control measures. Maintain accurate logs of these activities in the WIS.
- 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, translocation, or disposal sites.
- When a strike occurs, gather detailed information to complete/submit a strike report to the FAA. Inform the Aviation Wildlife Manager of all strike events.
- Perform raptor trapping activities including the 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 removal of nests.
- During the fall and winter months, inspect properties adjacent to the airfield for migratory waterfowl.
- 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 Aviation Wildlife Manager. Also report the effectiveness of current wildlife control activities.
- Assist the Aviation Wildlife Manager with training of new Wildlife Technicians, Student Positions and seasonal contractors.

2.3.4. Aviation Wildlife Student Position

Program Operations:

- Conduct physical inspections and patrols of the airfield to implement wildlife control measures as assigned by the Wildlife Technicians or Aviation Wildlife Manager. Maintain accurate logs of these activities in the WIS.
- Handle and transport wildlife removed from the airfield to the appropriate rehabilitation, translocation, or disposal sites.
- Maintain wildlife control equipment.
- Conduct scheduled avian point count surveys 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.

2.4. Roles & Responsibilities of Other Port Departments & OR ANG 142nd Fighter Wing

The Port recognizes that the cooperation of many departments both inside, and outside, of the Port is necessary for the successful implementation of the WHMP. Detailed roles and responsibilities matrices have been developed as part of the Port's EMS. Identified points of coordination with this WHMP are listed in the following section for the Port Airport Operations, Maintenance, Media Relations, Legal and the OR ANG 142nd Fighter Wing.

2.4.1. Other Port Departments

Airport Operations Manager

- Per the ACM, delegate the development, maintenance, and implementation of the WHMP to the 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 Wildlife 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.

Airport Maintenance Staff

- Report any wildlife hazards observed on the airfield to Wildlife staff.
- Work with Wildlife Staff to implement wildlife control projects.
- Coordinate with Wildlife Staff to minimize the attractiveness of airfield mowing and airport vegetation modifications.
- Coordinate with the Wildlife Manager when new landscaping is proposed.
- Maintain airfield drainage to minimize standing water.
- Coordinate with the Wildlife Manager for prey base (voles, grasshoppers, etc.) control on the airfield.
- Maintain current pesticide applicator's certification in compliance with EPA standards.

Media Relations

- Provide, when possible, outreach opportunities to the public regarding the WHMP.
- Pass on any concerns received from the media or the public to the Wildlife Manager to address the concern.

- Communicate with Wildlife Staff to understand issues that may trigger public concern. Give advice on how to handle these situations.

- Work with the Wildlife Manager to develop public information and education campaigns on specific issues of public interest or controversy.

Legal Administration

- Provide legal review, direction, and advice as necessary.

- Provide input into the development of management plans and strategies to ensure that the program is defensible in a legal context.

- Recognize the need for, and provide guidance in a highly complex (and sometimes conflicting) regulatory environment that includes the full spectrum of federal, state and local jurisdictional constraints.

- Elevate awareness of safety and regulatory constraints, and liability concerns, unique to the operation of an airport.

2.4.2. OR ANG 142nd Fighter Wing

OR ANG Safety Officer

- Monitor installation compliance with AFI 91-202 and reports all bird strikes and hazards per AFIs 91-204, 91-202.

- Report on BASH and include Bird Hazard Working Group (BHWG) recommendations and actions in the agenda and minutes of the wing's quarterly safety meetings.

- Disseminate BASH data to BHWG and flying units.

- Coordinate with aircrews and maintenance personnel in the collection of remains following strike events. Sends any salvaged strike remains to the Smithsonian Institution.

- Provide strike information to the PDX Wildlife Manager to ensure accurate reporting between the base and PDX. This includes notification of the species identification from the Smithsonian Institute's Feather Lab.

- Notify PDX Wildlife of all bird strikes within 24 hours (503.830.0713).

OR ANG Airfield Manager

- During daily flight operations, the on-duty Airfield Manager will coordinate with the PDX Wildlife Staff to establish the current Bird Watch Condition.

- When a hazardous bird condition is observed on the base, the Airfield Manager will obtain approval to perform dispersal activities. The Airfield Manager then notifies the OR ANG BASH team who implements the dispersal. Coordination

with the PDX Wildlife Staff and Air Traffic Control is required. The OR ANG BASH team members will only operate in direct concert with PDX Wildlife.

- Notify 142nd FW Command Post, Security Forces and the ATCT when significant bird dispersal activities will be necessary on the airfield/base.
- Conduct daily airfield inspection. Dead birds, possibly involved in strikes to ANG aircraft, should be removed and forwarded to wing safety for identification and shared with airport operations, PDX Wildlife, or other users.

3 WILDLIFE MANAGEMENT STRATEGIES [14 CFR 139.337f (2)]

The management strategies and general operational strategies contained in this chapter are 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. All management actions identified in this chapter are subject to reassessment and validation through the risk evaluation process and adaptive management.

3.1. Risk Evaluation Process

The Port uses a systematic approach to assess wildlife hazards at the airport, and to prioritize actions based on the relative levels of risk they create. This approach to risk evaluation is a pro-active and adaptive process that is able to identify wildlife hazards, assess risks, and prioritize management actions which 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 the 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 model. Based on the results of these evaluations, the Port is able to prioritize species specific risk management activities and ensure that risk-based decision-making is used throughout the wildlife hazard management process.

The Port has defined "Severity of Impact" as "the likely severity of the damage that will occur to an aircraft if a collision occurs with wildlife on or near an airport." To assess the likely severity of a collision with a given species, the Port uses FAA national strike data indicating the proportion of strikes with the species that have resulted in damage to the aircraft struck. The greater the percentage of strikes resulting in damage, the greater the potential "Severity of Impact" for the species in the Port's risk evaluation model. The potential severity of impact portion of the model is divided into five decreasing levels of severity based on the respective decreases in percentages as shown below:

Percentage of strikes causing damage (*based on FAA national data*)	>20%	10-20%	6-9.9%	2-5.9%	0-1.9%
Severity category	Very High	High	Moderate	Low	Very Low

The Port defines "Probability of Occurrence" as the likelihood that an adverse event, (i.e., a collision involving an aircraft and wildlife), will occur at PDX. As with the severity of impact evaluation, the probability of a strike occurring is divided into five categories ranging from very high to very low. A particular species placement in a probability category is based on the number of PDX strikes per year for that species averaged over a five-year period, as shown below:

Average Number of Strikes per year (*based on PDX data*)	>10	3-10	1-2.9	0.3-0.9	0.2-0
Probability category	Very High	High	Moderate	Low	Very Low

		PROBABILITY OF OCCURRENCE				
		Very High	**High**	**Moderate**	**Low**	**Very Low**
SEVERITY OF IMPACT	**Very High**	3	3	3	3	2
	High	3	3	3	2	2
	Moderate	3	3	2	1	1
	Low	2	2	1	1	1
	Very Low	1	1	1	1	1

Species that have been struck at PDX are placed into the appropriate place in the model based on the respective axis i.e. probability or severity. Species placed in the portion of the risk evaluation model shown in red are considered priority species for which the Port will implement an immediate action plan. Those species falling within the yellow portion of the model are species that are of lesser concern than the red species, but still may require management actions. Those species falling within the green portion of the model are species that warrant monitoring. Attachment A contains the completed model reflecting the current year's data, as well as the supporting data used to generate the model.

The complete risk evaluation model is included as Appendix B.

3.2. Zone Concept

FAA Advisory Circular 150/5200-33B provides guidance on the siting of certain land uses that have the potential to attract hazardous wildlife on or near public-use airports.

At airports serving turbine-powered aircraft such as PDX, the FAA recommends a separation distance of 10,000 feet be maintained between the aircraft operating area (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 150/5200-33B also recommends against siting certain significant 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 41% of all bird-aircraft strikes with commercial aircraft occur at 0 feet AGL, and 71% occur below 500 feet AGL (Dolbeer et al. 2016). 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 separation distance around the AOA at PDX into 3 zones: Primary Zone, Secondary Zone, and FAA Separation 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, both horizontally and vertically. A brief description of these 3 zones follows. Refer to Figure 4, Figure 5 & Figure 6 for a map of these zones. As reference, the 2009 WHMP referred to the Secondary Zone as the Intermediate Zone and specified the FAA Separation Zone as the Secondary Zone.

3.2.1. Primary Zone

The Primary Zone (Figure 4) 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 33 and the Port of Portland's Programmatic Tree Permit issued under Title 11, Trees –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 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.

3.2.2. Secondary Zone

The Secondary Zone (Figure 5) is the zone between the primary and the FAA Separation 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.

Land uses within the Secondary 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 4.1.1). Most of the land on the east end of the Secondary Zone is developed and contains airport parking, retail stores and other commercial businesses whereas the land on the west end is primarily undeveloped.

Change in land use proposals within 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 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. See Section 4.5.1 for details on the Portland International Airport Plan District.

3.2.3. FAA Separation Zone

The FAA Separation Zone (Figure 6) encompasses all remaining lands within the 10,000- foot separation distance established in FAA Advisory Circular 150-5200-33B that are not included in the Primary or Secondary Zones. It is the largest spatial area of the three zones. Most lands in the FAA Separation Zone are privately owned and are not under direct Port management. Land uses within the FAA Separation 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 Secondary Zone, land use proposals in the FAA Separation 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 FAA Separation Zone are assessed as a potential risk to aviation safety, the Port will take actions within its authority to discourage land use changes that increase the risk.

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Figure 4. Primary Zone

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Figure 5. Secondary Zone

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Figure 6. FAA Separation Zone

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3.3. Management Area Strategies

In order to document and organize all of the management concerns, constraints, and actions, PDX and the surrounding properties were divided into logical areas based on land-use, wildlife management, and habitat type. The division of these properties resulted in 11 distinct management areas (Figure 7). Management areas outside the airfield fence (areas B-L) are managed under the Undeveloped Properties Management Program which implements the risk management strategies included in the WHMP. The management areas are as follows:

A. Airfield (A-1, A-2)

B. East End of Runway 28R (B-1, B-2)

C. Airport Way

D. East of Runway 28L, Portland International Center (D-1, D-2)

E. Military (E-1, E-2)

F. South of Runway 3/21

G. SW Quad/Elrod Road (G-1, G-2)

H. West of NE 33rd Avenue

I. NW Airfield

J. Government Island

K. Fazio

This approach categorizes aviation wildlife hazards and operational strategies in a comprehensive spatial context for all Port-administered properties within the Primary, Secondary, and FAA Separation Zones. 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. It also facilitates the development of management scenarios, which utilize the best information currently available, based on wildlife observations and strike data at PDX. These management areas are subject to ongoing assessment and revision.

Appendix C presents a prioritized list of operational strategies to reduce the risks that wildlife poses to safe airport operations at PDX. The list includes a five-year history of completed habitat modifications and other projects designed to reduce the wildlife/aircraft strike potential, as well as a five-year outlook for actions needed in the near future. As mentioned previously, all management strategies identified in Appendix C are reassessed on an ongoing basis and adapted as needed to increase the overall effectiveness.

Within each management area, the risk management procedures discussed in Chapter 6 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) long-term management strategies, (3) research and development projects, 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 pillars follows.

Pillar # 1: Short-term Operational Strategies

The first pillar comprises the short-term operational strategies which address the need of the moment. It includes the reactive hazing program intended to clear the airspace of wildlife hazards that pose an immediate threat to safe aircraft operations. In addition, short-term habitat manipulations on a relatively small scale are included in this operational category such as mowing schedules, netting projects, perching deterrents, rodenticide applications and tree pruning/topping/removal.

Environmental stewardship is an integral part of the Port's overall business strategy. In support of this strategy, PDX has set a management objective to implement the first pillar by utilizing the full range of non-lethal technologies available whenever possible. However, implicit in this statement is the recognition that it may not always be possible to avoid lethal control. The 2019 WHMP identifies the decision-making process necessary for consideration of lethal action (Section 6.1.5), 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 that species' population as a whole. The only current exceptions to this rule are the European starling control program, and the prey base control strategies for grey-tailed voles and grasshoppers. The European starling is an introduced invasive species that presents a significant hazard to aviation (due primarily to its abundance and flocking behavior). 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 species of concern at PDX such as great blue herons, barn owls, great horned owls, and coyotes. Grasshoppers of various species are also abundant on the airfield and are an attractant for many species of concern such as the American kestrel, American crow, European starling, red-tailed hawks and others. 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.

Pillar # 2: Long-term Management Strategies

The second 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 carefully planned with consideration given to the ecosystem as a whole. Long-term management strategies may range from physically excluding wildlife permanently from an area (where possible), to habitat modifications, like tree or wetland removal.

Pillar # 3: Research & Development Projects

The third 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 to be effective over time. The information gained from research and development projects transfers into both short-term and long-term operational strategies.

Pillar # 4: Information and Education Programs

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. Participating in outreach opportunities also provides input that helps to tie PDX issues into its larger regional context.

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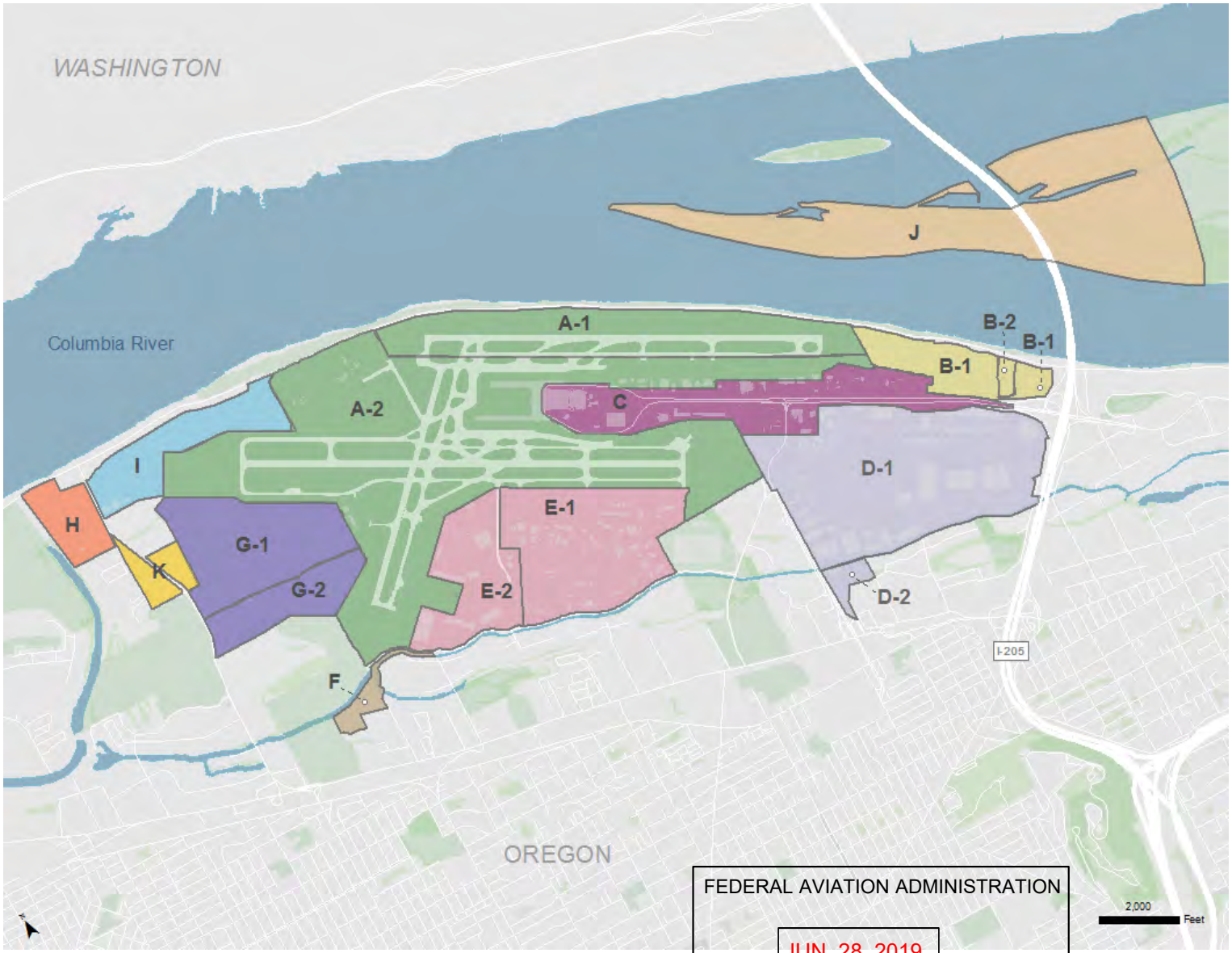
Figure 7. Location of wildlife management areas around PDX



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3.4. General Operational Strategies

All of the components described in the previous sections interact on a daily basis to resolve both immediate and long-term wildlife hazard issues at PDX. When a potentially hazardous situation is encountered, the first action is usually a reactive hazing tactic (except for species that cannot be effectively hazed, such as deer). The least aggressive tools are tried first, such as auditory and pyrotechnic harassment, to see if the wildlife species of concern can be effectively hazed from the 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 an increased hazing effort in response, 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 as a way 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 assessed for implementation. Staff must be cautious that a habitat modification does not inadvertently attract other wildlife species of concern. Projects involving habitat modifications will be in compliance with all federal, state, and local regulations.

The “research and development” pillar as well as the “information and education” pillar (Section 3.3) 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 may be implemented on a trial basis to determine if it is a potential solution. As new methods or materials are found to be effective, they will be integrated into 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 6.1.5.

Each of the four pillars work in concert with one another as an integrated and complete structure to support a comprehensive approach to wildlife hazard management at PDX: 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.

3.5. 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 #150/5200-33B). 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. Risk management procedures employed to immediately discourage, disperse and remove wildlife species of concern from high risk areas on the airfield are discussed in Chapter 6.

3.5.1. 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 as outlined in Title 33, chapter 565 of the City of Portland code 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 Secondary or FAA Separation Zones.

Many of the areas in the Secondary 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 this zone, the Sr. Natural Resources Manager will meet with the appropriate Port manager to discuss modifications to the habitat for wildlife control efforts. In addition, the Sr. Natural

Resources 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.

3.5.2. 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 Secondary & FAA Separation 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 Secondary & FAA Separation Zones, consistent with FAA AC 150/5200-33B. The risk evaluation process is used to assess whether the level of risk expected from actions in the Secondary & FAA Separation Zones would be acceptable. The Wildlife Manager, in cooperation with the Sr. 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. See Section 4.5.1 for details on the Portland International Airport Plan District. Proposed land use projects that will likely increase populations of species of concern, or their activity within aircraft flight zones, will be limited. 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 150/5200-33B.

The paragraphs below describe some of the Port's strategies for managing potential wildlife hazards on non-Port owned properties in the Secondary & FAA Separation Zones. More detail can also be found in Section 6.3, WHMP Information and Education. Knowledge gained from the Port's risk analysis will be used to inform future decisions regarding land uses in these 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 FAA AC 150/5200-33B 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 150/5200-33B, 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 Aviation 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 the FAA Separation 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 Sr. Natural Resources Manager to ensure that no new wildlife attractants with unacceptable risk are planned for adjacent properties.

Following a collaborative effort between the City of Portland and the Port of Portland, an integrated long range PDX Master Plan was developed. Central to this initiative was the creation in 2010 in City code of the Portland International Airport Plan District that recognizes PDX as a dedicated land use with specific compatible land use constraints in the interests of public aviation safety. The Portland International Airport Plan District incorporates by reference the current PDX WHMP Landscaping Standards for development on and around the airport and refers land development permit applications within the Portland International Airport Plan District to WHMP staff for compatible land use review.

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.

3.5.3. Water Management

Because of the attractiveness of water features including natural wetlands, man-made wetlands, storm water facilities, and other open water features 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 150/5200-33B, 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 Secondary 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 Secondary Zone, unless the risk evaluation indicates the level of risk incurred would be acceptable. Appendix C documents Port actions taken to date address aviation-wildlife hazards posed by wetlands and other waters of the U.S. located within the Secondary Zone.

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 storm water detention facilities. This achieves the dual purpose of removing attractive habitat features for waterfowl as well as preventing the development of jurisdictional wetland characteristics over time. In accordance with direction in AC 150/5200-33B, 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.

Non-jurisdictional areas of standing water and poor drainage on Port-owned lands in the Secondary 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 non-jurisdictional “wet areas” on Port-owned lands at PDX so they do not develop into jurisdictional wetlands at a future date.

1. The Port's 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 Port's 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 minor fill and 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 Port's 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.

Storm Water Management Systems

Common hydrophytic vegetation used in storm water management systems create a wildlife attractant concerns at airports. Swales that contain emergent vegetation are extremely attractive to waterfowl for nesting and shelter. With this in mind, the Approved Airport Plant List consists of five recommended woody shrub-scrub species. The intent is to reduce mobility in the vegetation and sense of safety for waterfowl that may otherwise be content.

In addition to the type of vegetation, many common storm water treatment and management options are highly attractive to wildlife such as detention ponds, infiltration basins, and swales. While managing for aviation wildlife issues, the Port of Portland also needs to stay in compliance with the local storm water management plans. This is achieved by determining the type of storm water facility and location relative to the airport, and determining whether or not it will become a safety concern for aviation wildlife hazard management. The Port has developed a Storm Water Design Standards Manual (DSM) that provides direction for designing storm water treatment and management systems. There are many storm water management options available that achieve the desired results without attracting wildlife that pose a risk to safe airport operations. To prevent these hazards, land-use planners and airport operators may need to develop management plans in compliance with local and state regulations to ensure a safe airport environment.

Existing Storm Water Systems

Any existing storm water detention ponds located in the Primary Zone, or on Port-owned land in the Secondary 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 storm water detention pond to modifying the pond to make it less attractive to wildlife species of concern (e.g., vegetation modification, installation of netting). AC 150/5200-33B section 2-3.a provides guidance for addressing existing storm water management facilities on or near public-use airports. Other storm water treatment options such as swales can also be modified to become less attractive to wildlife by modifying vegetation from emergent to the five recommended woody shrub-scrub species from the Airport Plant List (Appendix F) or by removing emergent vegetation and replacing it with rock to hide any free standing water.

New Storm Water Systems

Storm water management inside the Portland International Airport Plan District should at a minimum comply with the guidance established at the federal and state level and must comply with the Port's Storm Water DSM. 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, and 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 should be eliminated if it provides food or cover for hazardous wildlife. 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."*

The state guidance is found in the State of Oregon Airport Rules (Oregon Revised Statutes 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 Secondary Zone, storm water treatment options are even more limited by the PDX WHMP and the Port of Portland's Storm Water DSM. In addition, all projects must comply with the Port's Storm Water DSM which incorporates by reference landscaping requirements identified in this document. The intent of the Landscaping Standards and the DSM is to minimize wildlife attractants for storm water treatment systems and ensure existing conveyance systems have adequate capacity to manage flows without creating

surcharging or standing water for a 10-year rainfall event, which is the storm system design standard for PDX.

If, despite these guidelines, any existing or new storm water detention structure attracts wildlife species of concern, a risk evaluation will be performed to determine if additional modifications are necessary.

In general, new storm water detention ponds are prohibited in the Primary Zone. If located on Port-owned land in the Secondary 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. Installing netting at new open water features is not adequate as a cover to deter hazardous wildlife. The water surface must not be visible as an attractant; requiring the covers to be solid. Other storm water treatment options such as swales, filter strips, and sand filters may be allowed but must be approved by the Port of Portland Wildlife Manager. Wildlife staff will review all project proposals with new storm water treatment in the Primary and Secondary Zones. If proposals are incompatible with the PDX WHMP, Wildlife staff will work with project managers to identify storm water treatment options that will not create a wildlife attractant.

Although the airport does not have direct control over storm water management in the FAA Separation Zone, the wildlife program defers to the federal and state guidance for managing storm water facilities at and around airports. In general, the FAA Separation zone is far enough away from the airport that most storm water 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 Secondary 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 Secondary 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.

3.5.4. 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.

Because landscaping at an airport has the potential to create wildlife attractant issues the FAA has issued Advisory Circulars that address a variety of landscaping concerns. An FAA Advisory Circular provides guidance that should be adhered to by all Part 139 airports.

FAA Advisory Circular 150/5200-33B 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 Secondary Zones (Figure 4 &

FigureFigure 5) 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 (Appendix F, Airport 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 within the Airport Sub-district (Title 33, Planning & Zoning, chapter 33.565) of city code, and 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 the 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 Airport Plant List (Appendix F, Airport Plant List). 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. Evergreen shrubs may be planted adjacent to each other in groups of up to five. If there is more than one group of evergreen shrubs, there must be at least 10 feet between each group of shrubs. If shrubs are not planted in groups, there must be at least 10 feet between each shrub.

6. Landscaping will be a combination of evergreen and deciduous species of shrubs, with no greater than 50 percent of evergreen species.

Secondary Zone

The Secondary Zone is the zone between the Primary and FAA Separation Zones (Figure 5). 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 Secondary 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 Secondary 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 Secondary zone. Currently the PDX Landscaping Standards for all lands in the Secondary 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 Secondary Zone.

2. Species of vegetation must be represented on the Secondary and/or Primary Zone plant species list. (Appendix F, Airport Plant List). 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 (Figure 8). 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 8. 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. Tree species selected should tend toward columnar shapes, which have a vertical branching structure that minimizes perching and nesting opportunities for birds (Figure 9 & Figure 10).

Figure 9. An example of a tree species that is attractive to birds because of its horizontal branching structure.

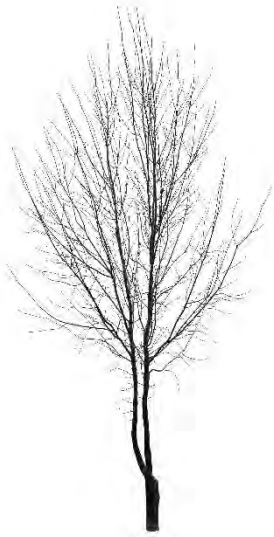

Figure 10. An example of an ideal tree type for landscaping at PDX because it has minimal opportunities for perching and nesting due to its vertical branching structure.

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

7. 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 (13) feet at maturity[2]. Shrubs will be planted 10 feet away from all trees[3] (Figure 11).

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 Airport Landscape Standards.

[2] 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.

[3] 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.

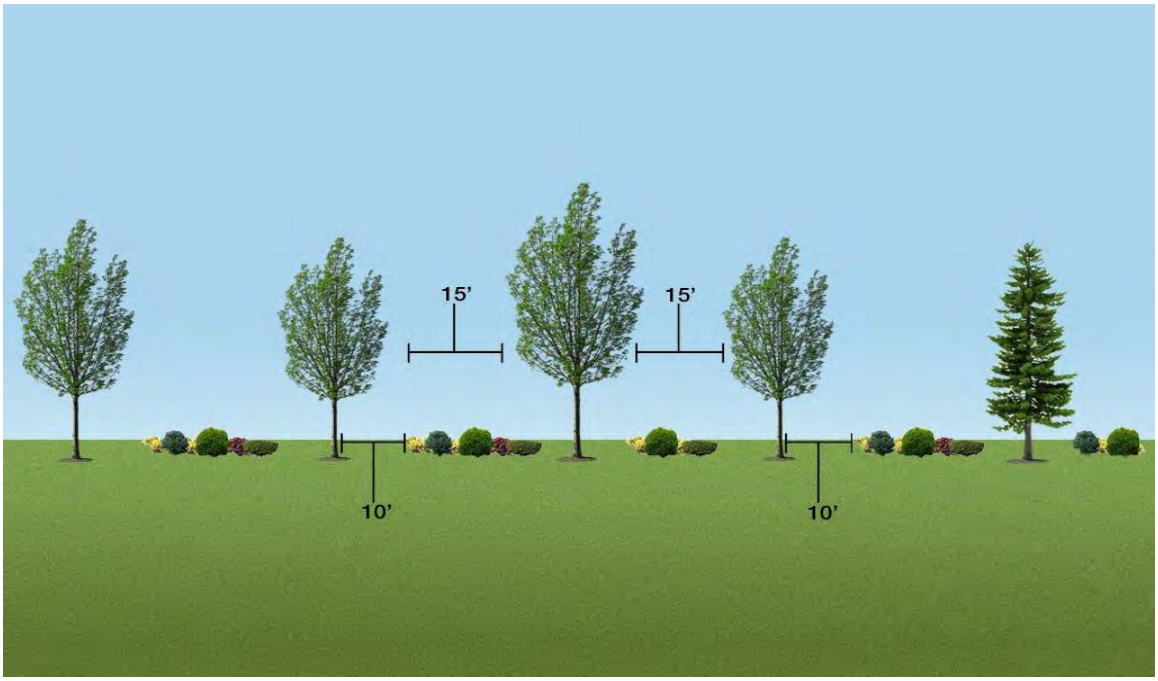

Figure 11. Conceptual landscaping design for the Secondary Zone that demonstrates discontinuous crown closure at both a vertical and horizontal scale.

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 storm water 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 Secondary Zone may be sprayed with an herbicide type agent, and/or physically removed.

Grass Type

The Port's T-901 seed specifications for grass is currently planted and maintained in the Primary Zone, and over much of the Port-owned land in the Secondary Zone. These specifications are a low-maintenance endophyte enhanced tall fescue seed mix. This grass mix grows very well under the normal climatic conditions of the region. 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.

Seed mix shall be a three-way blend of endophyte enhanced dwarf turf type tall fescue meeting the following criteria:

Table 2. Aviation Grass Seed Specification.

Seed	Percent PLS	Min Seed Purity (Percent)	Minimum Germination (Percent)	Endophyte Enhanced (Percent)
Seed Type 1	33	98 min	90 min	80 min
Seed Type 2	33	98 min	90 min	80 min
Seed Type 3	33	98 min	90 min	80 min
Inert Matter	1			

PLS (pure live seed) is the amount of living, viable seed in a larger total amount of seed. The amount of seed to be applied is obtained by using the purity and germination percentages from the label on the actual bag of seed to be used on the project. To calculate the amount of seed to be applied:

a. Obtain the PLS factor by multiplying the seed label germination percentage with the seed label purity percentage;

b. Divide the specified PLS rate by the PLS factor;

c. Round off the result as approved.

Seeding shall be performed during the period between September 1 and October 15, unless otherwise approved or directed by the Port. After October 15th an additional 30% of Annual Rye by weight, may be used as an erosion control BMP. Perennial Rye grass is not approved for use at PDX.

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 during mowing operations, grass within the runway safety area will be mowed only at night with the runway closed. The runway 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 area 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 Secondary 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 emergent 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.

Landscaping of Stormwater Systems

Vegetation used alongside open drainage features are hazardous wildlife attractant concerns at any airport. Swales that contain emergent vegetation are extremely attractive to waterfowl for nesting and shelter. With this in mind, the Airport Plant List (Appendix F) consists of five recommended woody shrub-scrub species. The intent is to

reduce mobility in the vegetation and sense of safety for waterfowl that may otherwise be content.

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 Secondary 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 Secondary 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 150/5200-33B, section 2-6 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.

3.5.5. 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 to aviation safety, and should not allow access to such mammals as coyotes, rabbits and rodents.

Management to reduce the attractiveness of structures to wildlife 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 Secondary 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 Secondary 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 Secondary 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 AppendixG. 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 storm water 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 storm water 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.

3.5.6. 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 Secondary Zones may contribute to the increased presence of wildlife species of concern in the Primary Zone. For example, attractive food sources in the 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 Secondary 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 Carbaryl and Dimilin. Dimilin is used before the grasshoppers 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. 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 main 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). The small mammal population is monitored to 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). The Port will continue to implement a rodenticide program to reduce vole numbers. Broadcast baiting with pelletized zinc phosphide (ZP) usually works well with voles (and other small rodents). It should be applied when succulent vegetation for foraging is less abundant and voles are more vulnerable. Following treatments, birds should be aggressively hazed from the area to reduce the primary hazard to non-target species.

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 Secondary 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. For example, a past problem was 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 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 resolved this problem. 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 & herbicides 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.

4 APPLICABLE LAWS, REGULATIONS, POLICIES & PERMITS [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.

4.1. FAA Requirements

4.1.1. 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.

4.1.2. 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.

The 2019 PDX WHMP update is a revision of the 2009 PDX WHMP which was authorized by the FAA on October 13, 2009. This 2019 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 7 years, and includes minor editorial corrections and restructuring.

FAA Advisory Circular (AC) No. 150/5200-33B: 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 150/5200-33B recommends that "hazardous wildlife attractants" be separated from the airport's air operations area 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 150/5200-33B 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 150/5200-33B 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 150/5200-33B to ensure that the proposed wildlife management practices, including habitat modification and mitigation activities, are consistent with the recommendations provided in the circular. AC 150/5200-33 is under revision, refer to the FAA Wildlife Management Website for the most current version.

4.2. National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires that federal agencies study and disclose the effects of their proposed actions on the environment in either a Categorical Exclusion (CatEx), an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). Specifically, NEPA is triggered when there is a significant federal action such as authorization of a permit, an entitlement, or issuance of federal funding; 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 1050.1F,section 5.5, *Certification.*

4.3. Other Applicable Federal Regulations

4.3.1. 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 4.4.1). Mitigation for impacts to jurisdictional wetlands will be mitigated off-site outside of the 10,000 ft. separation distance as established in FAA Advisory Circular (AC) 150/5200-33B (section 1-3).

4.3.2. 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 prohibits the “take” of endangered species, which is defined to include harassing, harming, pursuing, hunting, wounding, killing, capturing, or collecting, or attempting any such activity. By rule adopted under Section 4(d) of the ESA, the USFWS has extended Section 9’s take prohibition to “threatened” species as well as endangered species.

US Fish and Wildlife Service (USFWS) has designated the Streaked horned lark (SHLA), *Eremophila alpestris strigata* as threatened under the Endangered Species Act (ESA) (see 78 Federal Register 61451, October 3, 2013). Although USFWS 4(d) rule extends the take prohibition to the SHLA, a special section 4(d) rule was also issued at the time of listing. This special 4(d) rule limits the take prohibition by exempting certain described activities, including regular airport operations and maintenance actions taken to implement a duly authorized WHMP. Bird/aircraft strikes are also exempted.

SHLA’s are known to nest and forage on PDX properties. The special 4(d) rule, however, exempts most regular airport operations including WHMP implementation from take liability. The Wildlife Hazard Management Program keeps the USFWS advised on all actions taken to implement the PDX WHMP that may affect SHLA’s that fall within the special 4(d) exemptions. With respect to NEPA, the special 4(d) exemption removes WHMP approval from the category of potentially “significant” federal action. Barring extraordinary circumstances, actions taken to approve and implement the WHMP, under the special 4(d) rule, would fall within the range of categorically exempt activities. The Port entered into an HCP with the USFWS concurrent with the issuance of an ITP for streaked horned larks on Port property in 2017.

Several other 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 as appropriate.

4.3.3. 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 a Depredation at Airports permit from the USFWS, which includes a depredation permit for lethal actions (see Section 4.6).

4.3.4. 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.

4.3.5. Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) gives the EPA authority over distribution, sale, and use of pesticides. Manufacturers must provide a label for and register a pesticide with the EPA before they can manufacture pesticides for commercial use, and facilities that use pesticides on their premises must comply with the requirements outlined by the EPA on each pesticide container label. In addition, restricted use pesticides must be applied by or under the direct supervision of an applicator certified by the EPA.

When wildlife hazard management practices at PDX require application of pesticide, the Port will ensure that pesticides are applied in accordance with both the EPA, and manufacturer's instructions.

4.4. State of Oregon Regulations

4.4.1. 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 150/5200-33B.

4.4.2. 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.

4.4.3. 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 wildlife in Oregon. 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 4.6). The Port's Scientific Taking permit is renewed annually.

4.4.4. 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 4.6).

4.4.5. Oregon Administrative Rules 837-012-0305 to 0370 [Pest Control Fireworks Permit]

Under OAR 837-012-0305 to 0370, pest control fireworks may only be used to repel birds or animals from properties if the birds or animals are or may be injurious or destructive to a property, including crops and livestock located on the property, identified in HB 2432 (2015 OL Ch. 57).Permits are issued in-two year blocks by the Office of State Fire Marshal. Wildlife hazard management practices at PDX require the use of pyrotechnics, therefore the Port holds a Pest Control Fireworks Permit from the State Fire Marshal (See Section 4.6).

4.4.6. 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).

If, despite these guidelines, any existing or new storm water detention structure attracts wildlife species of concern, a risk evaluation will be performed to determine if additional modifications are necessary. The State of Oregon Airport Rules (Oregon Revised Statutes 836.623) 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.

4.5. 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).

4.5.1. 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 12). 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 through the discretionary land use review process with the City of Portland, as outlined in Title 33.

Chapter 33.565, Portland International Airport Plan District

The regulations of this chapter implement elements of the Airport Futures Land Use Plan by addressing the social, economic, and environmental aspects of growth and development at PDX. The City recognizes the airport as a unique and dedicated land use that requires tailored regulations to address wildlife hazards and impacts to transportation and natural resources. The airport plan district provides flexibility to the Port (owner of PDX) to address a constantly changing aviation industry, while addressing the broader community impacts of operating an airport in an urban context.

Landscaping plant selection is an especially important component of the Airport Plan District (Figure 13). In an effort to reduce aviation wildlife hazards, the Airport Plant List provides a selection of appropriate plant materials and spacing standards that are to be used in the plan district. No landscaping is required inside or within 300 feet of the perimeter airfield fence. All landscaping, screening, and development outside the perimeter fence in the Airport Sub-district must meet the requirements outlined in the Airport Landscaping Standards and Title 33, chapter 565 of the City code.

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.

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Figure 12. City of Portland Designated Environmental Zones near Portland International Airport

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Figure 13. Airport Plan District

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4.6. Permits

The Port shall apply for, obtain and/or renew all necessary federal and state permits required to control wildlife on, and near the airfield. Table 3 provides a summary of the various federal, state, and local permits the Port has acquired to implement wildlife hazard management practices at PDX. Copies of the current permits issued to the Port for wildlife control are stored and maintained at the Port of Portland Headquarters building, 7200 Airport Way, Portland OR, 97218.

Table 3. Various federal, state, and local permits acquired 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
ESA, Section 4 & Section 10 4(d) Rule	USFWS	Allows incidental take of SHLA's due to regular airport operations [including bird strike] and airport maintenance activities taken to implement a WHMP.	Special 4(d) Rule for airports and SHLA's, Incidental Take Permit
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 at Airports Permit
Bald & Golden Eagle Protection Act	USFWS	Take, possession, or transport of a Bald or Golden Eagle, or their nest.	Eagle Permit

Applicable Law	Issuing Agency	Trigger	Type of Permit
State			
Removal-Fill Law	DSL	Removal or fill of materials into waters of the state.	Removal-Fill Permit
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.	Pest Control Fireworks Permit
Local			
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]. [Chapter 565]	Conditional Use Permit
Title 11, Trees, 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.

4.7. Port of Portland Missions, Goals & Policies

The 2019 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 that meets the CFR Part 139.337 mandate & ACM…which directly supports the Aviation and Port Mission Statements.

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

4.7.1. 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."

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."

Port of Portland Environmental Management System (EMS)

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. In 2014, the Port's EMS was certified to the ISO 14001:2004 standard.

This Wildlife Hazard Management Plan was developed in alignment with the Port's EMS. 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.

Port of Portland Environmental Policy (No.: 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 Natural Resources Policy (No.: 7.4.11)

"The Port will identify its impacts and will first attempt to avoid, then seek ways to minimize impacts when they cannot be avoided. When impacts to natural resources occur, appropriate mitigation methods will be implemented to enhance, restore, maintain, or replicate ecosystem functions and values, and ensure regulatory compliance."

4.7.2. 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.

5 RESOURCES TO IMPLEMENT THE PLAN [14 CFR 139.337f (4)]

Resources needed to support implementation of the WHMP are identified in this section. Wildlife control and habitat management equipment and supplies are available from a variety of commercial sources and vendors. The Airport will maintain an adequate supply of these resources on hand for use by trained personnel. The resource list will be updated as new wildlife hazard management tools and equipment are evaluated and acquired for use at PDX.

5.1. Wildlife Control Supplies

The following equipment and supplies are stocked in the Wildlife Office for use in implementation of the WHMP and control of hazardous wildlife:

- Field guides for wildlife and plant identification
- Binoculars and spotting scopes
- Cameras
- Thermal imagers
- Wildlife Information System
- Personal protective equipment (e.g., high visibility vests, hearing and eye protection, gloves)
- 15mm pyrotechnic pistol launchers
- Pyrotechnic ammunition (e.g., bird bangers, screamers, whistlers)
- 6 mm blank primers
- 12 gauge shotgun and nontoxic ammunition (i.e., steel shot)
- 12 gauge shellcrackers
- Net guns
- Cleaning kits for all firearms
- Air horns and sirens
- Remote control propane sound cannons
- Green lasers
- Paintball markers
- Live and lethal animal traps (e.g., snap traps, raptor traps, conibears, snares)

- Wildlife handling equipment (e.g., snare/catch poles, nets, blankets, animal carriers)
- Wildlife carcass storage equipment (e.g., refrigerator/freezer, , plastic bags)
- Personal cleaning supplies (e.g., hand sanitizer, cleaning wipes)
- Silt fencing for visual barriers
- Fire extinguishers
- Vegetation maintenance equipment (e.g., mowers, chainsaws, hand clippers)

Firearms, are stored within a secured gun safe and the ammunition and pyrotechnics are stored in a type 4 ATF approved magazine in the Wildlife Office when not in use. Only Wildlife Staff who have received training in firearm use and safety for wildlife control on the airfield are permitted access to lethal control equipment.

5.2. Vehicles

In order to effectively reach all areas of the airfield, wildlife control vehicles are all-wheel drive capable and painted hi-vis orange for program identification. These vehicles are equipped with both an 800 MHz radio and a VHF radio for communication with other airport users and 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. Many of the other supplies listed above may also be maintained in these vehicles.

6 RISK MANAGEMENT PROCEDURES [14 CFR 139.337f (5)]

The risk management procedures 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 Section 3.3 these measures are grouped according to the 4 pillars:

1. Short-term operational strategies to discourage, disperse and remove wildlife species of concern from the airfield and vicinity;

2. Long-term management practices, including habitat modifications and permanent site conversion, to reduce the attractiveness of features of the natural and built environments on and around the airport to wildlife species of concern;

3. 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; and

4. Information and education programs to communicate to internal and external stakeholders the hazards that wildlife can pose to the safe operation of aircraft.

All risk management procedures 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. Habitat management actions are addressed in Section 3.5.6. Personnel responsible for implementing risk management procedures is detailed in Chapter 2.

6.1. 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. See Chapter 5 for a list of the current resources dedicated to implementation of this Plan.

6.1.1. Personnel & Communications

Wildlife Staff are on duty 7 days a week. They are responsible for conducting physical inspections of airfield movement areas, and other areas critical to successfully manage known wildlife hazards before air carrier operations begin. 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.

All on duty Wildlife Staff carry an 800 MHz hand held radio with them at all times. This allows for communication between wildlife Staff and airfield operations as well as other Port groups and individuals. In addition, the primary Wildlife Staff person on duty carries a Port cell phone which augments the radio communications. These two communication systems help ensure timely and reliable responses to aviation wildlife issues.

Protocol for Airfield Access & 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 the AV Ops channel using established radio call signs.

3. Wildlife Staff will utilize tunable VHF radios (hand-held or vehicle) and maintain radio contact with the FAA Air Traffic Control Tower (ATCT) at all times when working on or adjacent to a movement area. Unless an alternate discrete frequency is specifically assigned by the ATCT, communication 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 the specific area. Access will be considered and approved by AF1 based on anticipated airfield impacts.

2. If access is approved by AF1, Wildlife Staff will be instructed to contact the ATCT 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 the ATCT when clear of the movement area. Crossing a movement area and then parking outside the safety area will require clearance from the ATCT 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 advise of the situation and await direction from AF1.

6. Vehicles will not be allowed to be parked on any movement area or in the safety area unless approved by the ATCT.

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.

3. Wildlife Staff and all associated equipment must be able to clear any area immediately when instructed by the ATCT 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 OR ANG base by Port Wildlife Staff. Compliance with this protocol, detailed in the 2017 142nd FW BASH Plan (Appendix E), is mandatory. Port Wildlife Staff has the primary responsibility when implementing all aviation wildlife management techniques at PDX for the OR ANG 142nd Fighter Wing as well as all commercial airlines and general aviation. In August 2008, the Wing's BASH plan was rewritten to integrate with 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 2017 BASH plan is presented in its entirety in Appendix E.

6.1.2. 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. This program is tied to air traffic patterns and wildlife activity levels at PDX and is staffed accordingly. Techniques currently used to haze birds include pyrotechnic devices (e.g., shell launching pistols, 12-gauge shotguns), remote controlled propane sound 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 they do not relocate to another part of the 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 WIS for future retrieval and evaluation (see Chapter 7). Before implementing any hazing techniques Wildlife Staff will assess the location of wildlife relative to aircraft operations and will determine the appropriate method and timing for hazing.

Based on the findings of the ongoing, iterative risk analysis process and the results of research and development trials of new technologies 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. Refer to Chapter 5 for a complete list of all resources currently dedicated to control of hazardous wildlife on the airfield.

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 pistols are used to fire a 15mm cartridge (Bird Banger or Screamer Siren). Bird Banger's travel approximately 50 feet and explode with a loud report. Screamer Siren's travel approximately 275 feet and make a whistling noise for the duration of their travel after being launched. Shell pistols give the operator in the field the flexibility of localized bird control in a simple and timely manner.

When increased range is required, a 12-gauge shotgun may be used to launch scare cartridges. When discharged, these cartridges travel approximately 375 feet before exploding with a loud report. An added benefit of scare cartridges is that they do not generate foreign object debris (FOD).

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 cartridges are carried in all wildlife control vehicles in which the technician is qualified to discharge pyrotechnics.

Remote Controlled Propane Sound 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 sound 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 on 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.

Visual Deterrents

Green laser

The FAA has conducted an aeronautical study on the use of outdoor laser operations at PDX. Based on this study, the FAA has approved laser operations at PDX. Wildlife Staff follow the protocol outlined in an FAA letter approving lasers at PDX at all times. This includes continuous termination of the beam on the ground while in use and avoiding the illumination of reflective surfaces such as airfield signage and standing water.

The laser is primarily used to disperse birds that are outside of the range of pyrotechnics and cannons or are in a noise sensitive area. 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. When Wildlife Staff identify the need to use the laser they 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 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 will be used to discourage wildlife from using the airfield only after other dispersal techniques (vehicle, siren, horn, cannons, pyrotechnics, etc.) have proven ineffective. Only trained Wildlife Staff are authorized to use paintball markers. The training includes procedures to minimize potential injuries to birds and mammals. Paintballs are used as negative reinforcement when birds have become habituated to other hazing strategies. Using paintballs in conjunction with pyrotechnics causes wildlife to associate fear with noise.

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

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. FOD from paintballs will be removed from the movement area. No paintballs with colored paint will be shot toward movement area markings or signage; only clear paint balls will be used under these circumstances.

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 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 move 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 activated when they can be seen to ensure no one is in the immediate vicinity when it is firing.

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.

8. Wildlife staff will discourage nesting attempts on the airfield and will employ hazing techniques to encourage SHLA's to move out of harm's way. Wildlife staff will not haze or harass adults with active nests unless they are an immediate risk to aircraft or themselves (inside the aircraft movement area/runway safety area). Following verification that fledglings have flight capabilities, Wildlife staff will attempt to move them out of harm's way in the interests of their safety and aviation safety. Wildlife staff monitor/document all SHLA situations on the airfield and discourage other nesting attempts on the airfield throughout the nesting season. All actions taken regarding SHLA's on the airfield will be in accordance with the PDX WHMP and the special 4(d) rule provisions for implementation of the WHMP. The USFWS will be advised in a timely manner if and when there is a change in strategy.

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 discharge the pyrotechnic 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 returning. In addition, use of propane sound cannons in conjunction with the pyrotechnics 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.

OR ANG Protocol for Hazing Birds

The following is the protocol implemented by the OR ANG Airfield Manager when hazing wildlife on the OR ANG base:

a) The OR ANG Airfield Manager notifies the OR ANG BASH Team that bird dispersal is needed. When approved to perform dispersal activities on the airfield, this team will be used when birds create a hazardous condition. Coordination with the Portland International Airport Wildlife Staff and Air Traffic Control is required. 142 FW dispersal team members will only operate in direct concert with PDX Wildlife. NOTE: Formal notification procedures are outlined in PIA Instruction 91-212, BASH Hazing Procedures on PANG Base Property.

b) Notifies 142 FW Command Post, Security Forces and ATC when significant bird scare activities will be necessary on the airfield.

Protocol for Management of Mammals

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 pose a significant threat to aircraft and public safety, Wildlife Staff 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 safety, action may be taken to remove the risk that specific individual poses.

Trapping feral cats for adoption is outside the scope of the PDX Wildlife Hazard Management program. However, if feral cats are trapped at PDX they will not be released back onto Port property and will be taken to Multnomah County Animal Control

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 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. 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 cases where the animal will not respond to all other means and continues to disrupt airport operations and present an ongoing threat to safe aircraft operations, lethal direct action may be authorized (refer to Section 6.1.5).

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 should not be dispersed with a vehicle or pyrotechnics as they will panic and can harm themselves or others.

Deer located outside the security fence and not located in the Port economy parking facilities ultimately falls under the jurisdiction of the ODFW. For deer in these situations, ODFW has instructed the Port to take no action other than to report the deer and its location to the Multnomah County Sheriff's department.

Raccoons

Raccoons are occasionally seen at PDX, and will be dispersed away from movement areas. Problem raccoons may be trapped and euthanized. If there are problems with raccoons off 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 Port infrastructure from beaver and nutria damage the Port holds a Beaver take permit, with ODFW for lethal control of beaver and nutria within aviation property.

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 captured, they should be put in a portable kennel and returned to the airline. If they cannot, Wildlife Staff or Airfield-1 will attempt to contact the owner to assist in capture. Airlines are encouraged to check the integrity of portable kennels used to transport dogs. If needed, PDX Wildlife will contact Multnomah County Animal Control

for dogs outside of the airport security fence. A dog whose owner is unknown will be transferred to Multnomah County Animal Control.

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 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. Currently, the vole population is controlled via an annual rodenticide application.

6.1.3. Raptor Trapping & Translocation

The trapping, banding and translocation 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 translocated. Raptor translocation is considered an ongoing management practice because of the attractiveness of the airfield to raptors. 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.

- Raptors are primarily captured with bal-chatri and goshawk traps baited with domestic mice, gerbils, house sparrows, European starlings, or pigeons. Other trap types such as European starlings or pigeons fitted with noosed jackets, among others, may also be used as allowed by state and federal permits.

- 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 along with matching patagial tags. 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 within 24 hours.

- 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 include 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. Other release sites include state and federally

approved sites in northern Washington. Beginning in June and continuing through October, the primary release sites for red-tailed hawks are in the southern Willamette Valley. Other release sites are used during periods of high raptor activity to limit saturating any one particular site with the intent of reducing the number returning to PDX.

6.1.4. 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.

Raptor Nests

Raptor nest manipulation is intended to prevent offspring from fledging near the airfield where they may become imprinted to the area. The Port applies to the ODFW for authorization to conduct raptor nest manipulation as needed. 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 translocation of chicks.

Waterfowl Nests

Nests of Canada geese and mallards located on and around the airfield are subject to removal due to the species hazard level and the risk they pose to safe airport operations. The Portis permitted through the federal Depredation at Airports permit issued by the USFWS.

6.1.5. 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 removal of birds is allowed under a Depredation at Airports permit issued by the USFWS and will always be accomplished in accordance with permit conditions/authorizations. Lethal action using firearms is authorized at the program level by the Chief Operating Officer; 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 vests clearly marked with “PDX Wildlife” are worn while implementing lethal control measures.

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.

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 dependent on the species involved.

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, have proven ineffective, and the wildlife hazard poses an ongoing threat to aviation safety, lethal action may be necessary.

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

Method: The method of lethal removal will be based on the species encountered and the circumstances of any given situation. Only staff that have completed firearms training and have demonstrated proficiency with their use will be authorized to use lethal control with this equipment. Personnel implementing lethal action 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 an individual problem animal has been identified and the decision has been made to target that individual for direct lethal control:

- Wildlife Staff will advise Airfield 1 of the situation.

- 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 that they are 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.

- 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 who implemented the lethal action will document the event in the WIS.

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 Sr. 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 a 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 100.

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 doesn't create any other environmental concerns.

Documentation: Documentation will be made by the Sr. Natural Resources 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 Aviation 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 14.

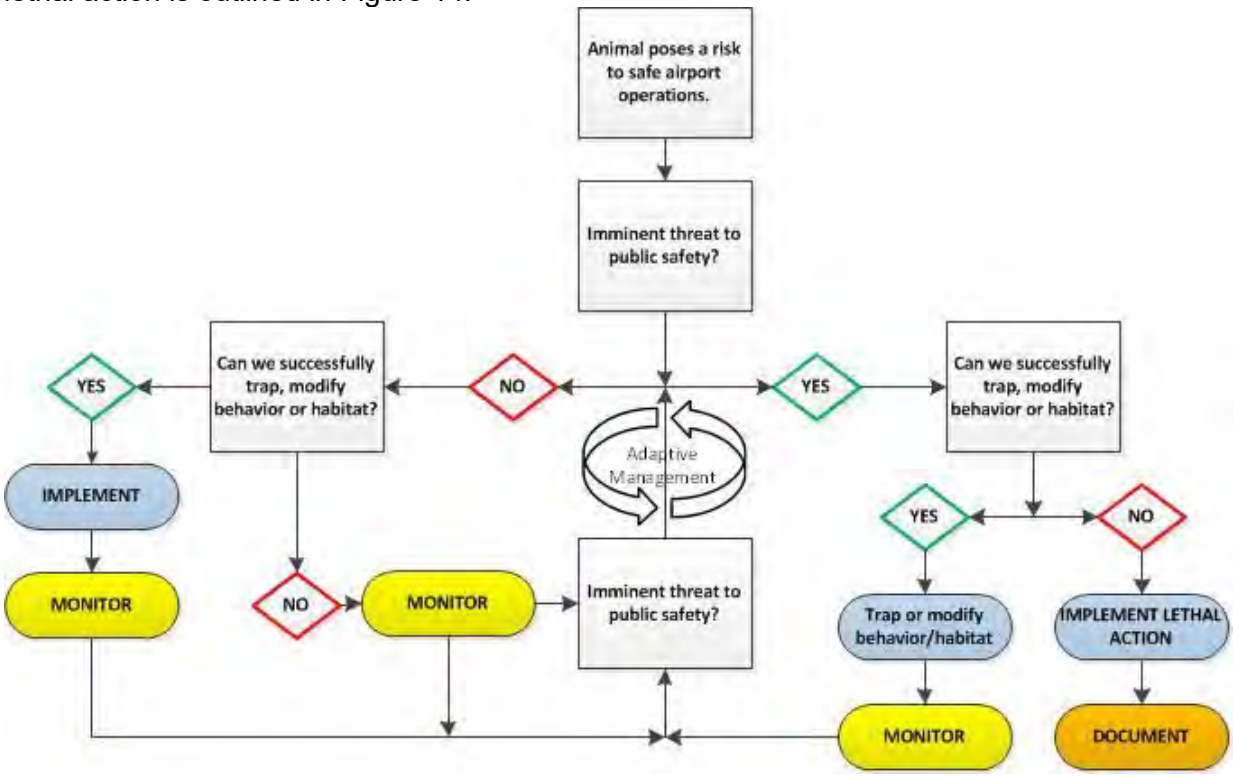

Figure 14. Lethal action decision flowchart

FEDERAL AVIATION ADMINISTRATION

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CLJ
INSPECTOR

European Starling Trapping Protocol

Materials

Port Starling traps with funnel openings 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 be removed frequently during those seasons when large numbers are being trapped.

3. Mortalities will be removed from the traps when observed.

Euthanasia Protocol

1. Before euthanasia of starlings is performed, all non-target birds will be removed from the traps and released if appropriate (dependent of the species).

2. Haze starlings into a plastic bag and fill with CO2 to ensure a quick and humane euthanasia.

3. Some starlings may be left in the traps to lure other birds in.

4. Euthanized starlings will be transported to a local incineration facility or will be frozen for transport at a later time. When appropriate, starlings may be donated for educational/research and to raptor care facilities as a food source or prey.

Data Recording

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

6.2. Research & 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 control measures are developed, PDX will evaluate these on an individual basis for cost, effectiveness, and impacts to the environment. 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, with minimal environmental impacts, 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 when they become commercially available and 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, and lasers). Other future control options could include alternatives to grass cover on Port-owned lands to reduce rodent populations that attract raptors, great blue herons and other wildlife species of concern (e.g., paving, grass-crete, artificial turf, shrub cover) and new hazing devices.

6.3. WHMP Information & Education

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 to inform and educate others also provides opportunity for input that helps to tie PDX issues into its larger regional context.

6.3.1. 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 2.0, including the interaction between the Sr. Natural Resources 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 at 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 also given the opportunity 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.

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

6.3.2. 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 feedback and/or advice. 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 Aviation 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 forum that puts the WHMP into a larger regional context and facilitates information 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 to increase their knowledge of wildlife related topics.

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 on 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 also be contacted if they have an attractant of concern on their property in order to discuss the problem and any possible solutions.

If land use practices are proposed for adjacent lands that are in conflict with safe aircraft operations, as outlined in FAA AC 150/5200-33B, 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 Industrial Development and Aviation Long Range Planning departments are often involved in land use decisions, and will coordinate with the Sr. Natural Resources Manager to ensure that no new wildlife attractants are planned for adjacent properties, whether they are Port-owned or privately owned.

The Airport Futures Land Use Planning 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.

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7 MONITORING, EVALUATION AND REPORTING [14 CFR 139.337f (7)]

The PDX Wildlife Hazard Management Program collects and maintains data on wildlife occurrence, wildlife-aviation strikes, and wildlife hazard management activities undertaken on the airport and surrounding environs. This information is used to identify patterns and trends in hazardous wildlife presence at PDX, and to assess the effectiveness of WHMP measures at resolving wildlife-aviation conflicts. New actions proposed on the Airport are reviewed to ensure they would not inadvertently create new hazardous wildlife attractants. Wildlife hazards listed in the WHMP and observed on and around the airport are re-evaluated annually. If wildlife-aviation risk changes over time, the causes will examined and the WHMP updated as warranted to address any new risks identified. A review of the WHMP will be conducted annually, with the results submitted to the FAA. This annual report serves as an ongoing WHA program review.

7.1. Wildlife Monitoring and Data Collection

7.1.1. Wildlife Data Collection

The Port's WIS 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 the WIS, its logical organization allows general trend analysis, and georeferenced wildlife activity records. Custom reports can be easily generated for review, enabling well-informed management decisions. 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 in the WIS:

Date/time of occurrence. The date and time for each wildlife entry is automatically populated by the PDX Wildlife database program.

Weather. Weather conditions are recorded for all data entries in the WIS including: temperature, dew point, precipitation, cloud cover, wind speed and wind direction.

Location. The location of the species observed is recorded in the WIS using an aerial map and associated GPS coordinates. When wildlife is observed moving over or through an area, the coordinates where it is first observed are recorded.

Species observed. Any species that is not positively identified will be recorded as an "unidentified species". 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 a dispersal is initiated, it is then recorded as an additional observation.

Number observed. The number of individuals recorded for each species observed. When birds are in large flocks where counting each individual is not practical, the total flock size is estimated.

Behavior. The initial behavior of the observed species is recorded. If there is a notable change in the species behavior during the observation, additional information is recorded in the "notes" section.

Attractant. This is the landscape feature or life history requirement (i.e. food, water, shelter) that the animal is currently using or seeking.

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

Result. This documents the outcome of the hazing action. If no dispersal action is taken it is recorded as "observed".

Strike. If a species is involved in an aircraft strike, additional information is collected to complete an FAA strike report. The strike report is then sent electronically to the FAA. In the case of an aircraft strike, Wildlife Staff will collect as much of the following information as possible:

- Name of the airline, type of aircraft, type of engine and registration number
- Date, time and weather information
- Flight number (when applicable)
- Phase of flight
- Runway Used
- Part(s) of aircraft struck
- Aircraft damage, if any
- Effect on flight
- Species, number, and size category of the species struck

Notes. Any supplementary information that is relevant to the intervention being recorded is entered into the notes. This is where specific information about raptors is stored such as leg-band or wing-tag status, age class, gender, and other unique details that could

help to identify an individual. Other pertinent data include changes in behavior or interactions with other individuals that are observed.

Avian Point Count Surveys

The PDX point count survey is designed to sample the species composition and activity level of birds on the airfield and is an independent representation of wildlife activity apart from data collected during normal patrol and hazing operations. There are twelve points in all, that together cover the airfield entirely, and an additional point outside of the AOA to monitor activity at a nearby mitigation site. The point count is conducted every week and alternates between the morning (an hour after sunrise) and afternoon (starting between 12:00 and 14:00).

Each point count location is visited for six minutes. The first minute is a settling period for wildlife activity to acclimate to the presence of the observer. The observer collects the grid location, species, number, and activity of any birds seen within a five minute window after the acclimation period, then moves on to the next point. This point count survey first began in October of 2002 and has been performed consistently on a weekly schedule since May of 2004.

All of the point count surveys are conducted by MHCC Student Position under the direction of the Wildlife Manager. The avian point count survey protocol (Appendix H) is designed to sample the entire avian population within the fenced airfield perimeter.

Migratory Bird Surveys

The Migratory Bird Treaty Act was enacted in 1918 to protect migratory birds. The main objective of the act is to limit human activity in order to reduce the likelihood of a species becoming extinct due to human actions. Under the Act, the killing or possession of migratory birds, their nests or eggs is prohibited (Migratory Bird Treaty Act of 1918, 2016). In order to ensure compliance with the Act, Port actions likely to disrupt wildlife habitat are first surveyed by Wildlife Staff. In order to reduce the chance of disturbance to migratory birds, the Port attempts to phase its actions so they occur outside the nesting season. While the Port possesses a USFWS Depredation at Airports permit it is only used in the context of protecting public safety in accordance with this WHMP.

Streaked Horned Lark Surveys

The Streaked horned lark (*Eremophila alpestris strigata, SHLA*), a subspecies of the Horned Lark, was listed under the Endangered Species Act as threatened in October, 2013. Streaked horned larks have been observed on Port aviation properties since 2006. Currently, there is no formal, standardized protocol for monitoring the SHLA. However, the Port has proactively adopted and implemented a protocol titled *Survey Protocols and Strategies for Assessing Streaked Horned Lark Site Occupancy Status, Population Abundance, and Trends* developed through a collaborative effort with the Washington Department of Fish & Wildlife (WDFW) since 2012 (Pearson, et al. 2016). Wildlife Staff implement this line transect survey protocol every year during the nesting season for SHLA's on undeveloped Port property in order to determine site occupancy and abundance. In addition, Wildlife Staff also perform SHLA surveys as needed for specific areas that may contain suitable SHLA habitat which may be impacted by Port or FAA airport project/activities. All survey results are included and submitted to the USFWS in

the HCP annual report. These results are also presented to the FAA during the Bi-State, OR & WA SHLA annual meeting.

7.1.2. Wildlife Strikes

Regular inspections of the airfield are conducted by Wildlife Staff to monitor for the presence of hazardous wildlife populations, and identify potential wildlife-aviation conflicts. Wildlife Staff have been trained on the procedures for collecting bird strikes or wildlife remains found during inspections of the runways and taxiways. Any animal remains found within 250 ft. of the runways during these inspections will be considered an aircraft strike unless another cause of death is evident. All wildlife strikes recovered will be documented by submitting FAA Form 5200-7 electronically to the FAA Wildlife Strike Database. Any unidentifiable avian remains will be sent to the Smithsonian Institution's Feather Identification Lab for identification at no cost to the airport. Pilots are encouraged to notify the PDX Wildlife staff whenever a strike event occurs. The PDX Wildlife staff will complete and submit the report for the pilots and/or airlines directly to the FAA.

7.2. Project Evaluation

All proposed Airport activities and/or projects will be reviewed to ensure that new actions would not inadvertently create new hazardous wildlife attractants or lead to an increase in wildlife-aviation conflicts. For consistency and to prevent potential conflicts of use and/or safety issues, the following decision making processes have been developed for activities proposed 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.

7.2.1. Project Screening for Proposed Development

Activities and/or projects on Port lands within the 10,000-foot separation distance 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;
- Storm water Management;
- Mitigation projects and general enhancement of natural areas;

- Tenant or leasehold improvements.

In addition, the Port's Business Analysis and Term Sheet (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 Natural Resources Mitigation program. Mitigation 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, as well as landowners, to screen projects for potential wildlife hazards, primarily storm water management and landscaping.

7.2.2. Monitoring and Evaluations

The Port's EMS incorporates 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.

7.3. Annual Review and Reporting

14 CFR Part 139.337 requires an annual review of the airport's WHMP, and revision as necessary. In accordance with this mandate and because the program at PDX is one of delegated authority under the ACM, the PDX WHMP will be reviewed jointly by the Airside Operations Manager and the Wildlife Manager every 12 consecutive months. This review will take place in the spring of each 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 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. The report will describe patterns and trends in hazardous wildlife usage observed on the airfield over the course of the year, summarize the wildlife deterrent and abatement measures applied that year, and assess the effectiveness of the abatement measures at resolving wildlife-aviation conflicts. This documentation serves as the on-going WHA for PDX following the guidance in AC 150/5200-38. At a minimum, the information in the annual report will include:

- A summary of hazardous wildlife observations and wildlife-aviation conflicts (including aircraft strikes) documented that year;
- Wildlife habitat management and population control efforts undertaken, including lethal removal;
- Animal-caused damage to airport structures, facilities, fencing, or other infrastructure;
- An evaluation of the WHMP's general effectiveness in coping with known wildlife hazards on and in the vicinity of PDX;
- Identification of and recommended approaches for addressing new or unresolved wildlife-aviation risk.

Appendix C in this WHMP presents a prioritized list of current habitat management actions earmarked for mitigating wildlife hazards at the airport. The implementation of these measures will be tracked and their completion status will be recorded as a running five-year historical record of actions undertaken to support the WHMP. Once implemented, these habitat management measures will be monitored to track their effectiveness and to ensure that these measures do not contribute to new wildlife conflicts. The Prioritized List of Actions Tables in Appendix C will be updated annually for FAA submittal as part of the annual review and reporting process. 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 conducted every 12 consecutive calendar months, the PDX WHMP will be reviewed and evaluated whenever an air carrier aircraft experiences any of the following events:

- 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. WHMP program accomplishment records pre-dating the current 5-year period covered by this 2019 WHMP version are documented in the compiled annual reports on file at the PDX WHMP office.

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

Training is essential for personnel involved in wildlife hazard abatement activities, and for the success of the WHMP. The Port will ensure that all personnel involved in wildlife deterrence and control at PDX are familiar with airfield access and safety protocols, knowledgeable in identification of local wildlife, and properly trained in the selection and application of appropriate control methodology. All training will be conducted by a qualified airport wildlife biologist that has met the requirements outlined in AC 150/5200-36A (*Qualifications for Wildlife Biologists Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports*), or by Wildlife Staff that have received training within the last 12 consecutive calendar months from a qualified airport wildlife biologist (per FAA AC 150/5200-36A).

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 4 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 4. PDX Wildlife Hazard Management program training requirements

Topic	Trainer
Wildlife Regulations and Laws	Port Staff
Airport Security Badge	Port Security Badging
Airfield Familiarization and Safety	Wildlife Manager
Airfield Movement Area Access	Airside Operations
Coordination with the FAA ATCT / 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, etc.)	Wildlife Manager or Wildlife Technician
FAA Codes Regulating Wildlife Control at Airports	Wildlife Manager
Protocol for Starling Trapping	Wildlife Manager or Wildlife Technician
WIS Database Procedures and Protocols	Wildlife Manager or Wildlife Technician
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, Banding and Translocation	Pacific Habitat Services or Wildlife Manager
Overview of Species of Concern and Strike History for PDX	Wildlife Manager

Additional training opportunities will be required as new projects, issues, or equipment are implemented.

Refresher training and recurrent training

Recurrent training is required for all personnel involved with the implementation of the Wildlife Hazard Management Plan. This training is conducted at minimum every 12 consecutive calendar months by a qualified airport wildlife biologist, or by Wildlife Staff trained within the last 12 months by a qualified airport wildlife biologist (per FAA AC 150/5200-36A). The Wildlife Manager maintains and submits Wildlife Staff training records to the FAA during the Annual Certification Inspections.

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APPENDIX A Table of Revisions

FEDERAL AVIATION ADMINISTRATION

JUN 28 2019

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Table of Revisions 2009 - 2019

Reference	Page(s)	Change	Reason
Airport Certification Manual Reference	---	Added that the WHMP is implemented by delegation of authority under the ACM. Made minor grammatical changes.	Clarification and general update
Table of Contents and List of Figures/Tables	i-x	Updated to reflect changes in the document.	Changes made throughout the document
xiii Annual Review and Reporting Statement	---	Removed section.	No longer needed as this is captured in the Management Actions tracking table.
Executive Summary	E1-E5	Updated multiple areas to match the updated WHMP.	Changes made throughout the document.
Section 1	(1-16)	Combined sections 1.0, 1.1, 1.2, and 1.3 into one section.	Improved the document structure and updated the passenger, operations and strike numbers with current information.
Intro Paragraph	1	Added introductory paragraph to summarize this section.	General update
1.1.1	1	Updated strike numbers and references with current information. Removed reference to strikes being under-reported nationally. Made grammatical changes including incorporating the second paragraph into the first.	General update
1.1.2	2-3	Updated statistics and references with current information. Updated listed length of runways and removed description of runway orientations.	General update
1.1.3	3	The 3rd bullet point was removed and a point about reviewing land use changes was added.	Highlighting the importance of compatible land uses for safe airport operations.
1.2	3-4	Made grammatical corrections and changed reference to data collection system from AIRMAN to WIS. Added declaration that FAA will be provided with a WHA annual report as part of the part 139 inspection.	Reference to PDX's continual monitoring and ongoing WHA.
1.2.1	4	Made grammatical corrections. Updated statistical references.	General update
1.2.2	4-5	Removed reference to current aircraft certification standards to withstand bird strikes. Updated statistics.	General update
Table 1	6	Updated with current information.	General update
1.2.3	6-8	Removed reference to Appendix B for how RTHA's use the airfield.	General update
1.2.4	8-9	NRI dataset was updated and field verified in 2014. Grammatical corrections were made to the last paragraph, along with referencing weekly point count surveys.	General update
1.3.1	9	Changed PDX potential wildlife hazard monitoring to daily. Added that the WHMP serves as the ongoing assessment for PDX. References Sec. 7.3 for more details.	Adjusted resources based on the need.
1.3.2	9-11	Made grammatical corrections. Adjusted reference list to match updated sections.	General update

FEDERAL AVIATION ADMINISTRATION

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April-2019

Table of Revisions 2009 - 2019

Reference	Page(s)	Change	Reason
1.3.3	11	Clarified what the three WHA's are. Added language about the ongoing WHA which is submitted to the FAA during Part 139 Annual Cert. Inspection. Updated database reference from AIRMAN to the WIS.	Clarification
1.3.4	11	Moved section about the Oregon Air National Guard BASH Plan from section 5.1.4 to 1.3.4. Added reference to OR ANG BASH team roles and responsibilities in section 2.4.2. Updated language to reflect current operating procedures. Changed Appendix references from H to D.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
Figure 1. & Figure 2.	11-16	Updated from 2009 maps to 2018 maps with intentional blank pages separating.	General update
Section 2	(17-24)	Moved this section from 2009 WHMP section 3.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
Title	17	Renamed title to Program Organization, Roles and Responsibilities [14 CFR 139.337f (1)].	General update
2.1	17	Made grammatical changes and updated language to reflect current departmental organization.	General update
Figure 3.	17	Changed figure number. Updated to current organizational chart.	General update, minor adjustments in staff
2.2	18	Changed title to Roles & Responsibilities of the Chief Operating Officer.	Title change
2.3	18	Made grammatical changes. Updated reference of where addition detail can be found.	General update
2.3.1	18	Removed introductory sentence. Changed vocabulary to match current Port staff titles. Made grammatical changes.	General update
2.3.2	18-20	changed title. Reorganized and added bullet points to reflect current program operations, maintenance, communication and scheduling/training.	General update
2.3.3	20-21	Made grammatical changes. Reorganized bullet points.	General update
2.3.4	21	Changed sub-section title to Aviation Wildlife Student Position.	General update
2.4	21	This section title now includes ORANG 142nd Fighter Wing. Made grammatical changes. Included the coordination with this WHMP with multiple departments and references 2017 142nd FW BASH Plan for ORANG's additional roles & responsibilities.	The Port's WHMP and the 142nd FW BASH plans are intergraded.
2.4.1	21-23	Added Roles/Responsibilities for Airport Maintenance Staff, Media Relations, and Legal Administration.	Clarification of other roles/responsibilities outside of the PDX Wildlife team.
2.4.2	23-24	Added this section ORANG 142nd Fighter Wing.	The Port's WHMP and the 142nd FW BASH plans are intergraded and reference each other.
Section 3	(25-66)	Moved from 2009 WHMP section 4.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337

FEDERAL AVIATION ADMINISTRATION

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April-2019

Table of Revisions 2009 - 2019

Reference	Page(s)	Change	Reason
Title	25	Renamed title to Wildlife Management Strategies [14 CFR 139.337f(2)].	General update
Intro Paragraph	25	Made grammatical changes. Added that all management actions are subject to reassessment.	General update
3.1	25-26	Made grammatical adjustments. Added in the definition of "Severity of Impact" with new risk evaluation models included.	General update
3.2	26-27	Made grammatical changes. Updated statistical information with current data. Updated section referencing to match current WHMP.	General update
3.2.1	27-28	Updated regulations and permitting references.	General update
3.2.2	28	Removed Intermediate Zone section.	Change in name not definition
3.2.3	28-29	Added this section for FAA Separation Zone.	Change in name not definition
Figure 4. & Figure 5.	30-36	Updated from 2009 maps to 2018 maps with intentional blank pages separating.	General update
3.3	37-39	Updated the PDX land/wildlife/habitat Management areas and refined the four wildlife hazard management pillars. Made grammatical changes and updated to current section referencing.	General update
Figure 7.	40-42	Updated from 2009 map to 2018 map with intentional blank pages separating.	General update
3.4	43-44	Inserted that habitat modifications will be compliant with all federal, state, and local regulations.	Clarification
3.5	44	Changed section to Habitat Modification.	Reorganized to increase readability
3.5.1	44-45	Changed section to Port-Owned Property.	Reorganized to increase readability
3.5.2	45-46	Changed section to Non-Port Owned Property.	Reorganized to increase readability
3.5.3	46-51	Reorganized section on Water Management.	General update
3.5.4	51-59	Reorganized section on Vegetation Management with updated facts & figures to show varied methods.	General update
3.5.5	59-62	Reorganized section on Structure Management.	General update
3.5.6	62-66	Reorganized section on Wildlife Food Source Management.	General update
Section 4	(67-82)	Moved this section from 2009 WHMP section 2.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
Title	67	Renamed title Applicable Law, Regulations, Policies, & Permits [14 CFR 139.337f (3)].	General update
4.1.2	68-69	Updated WHMP 2009 references with current 2019 version references.	General update
4.3.1	69-70	Updated section reference with current plan.	General update
4.3.2	70	Added in Streaked horned lark now as a threatened species under the Endangered Species Act (ESA) and how this affects the Port of Portland and the WHMP.	Clarification regarding the special 4(d) rule
4.3.3	71	Updated section reference with current plan.	General update
4.3.5	71	New section added on the Federal Insecticide, Fungicide, and Rodenticide Act.	Clarification

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Table of Revisions 2009 - 2019

Reference	Page(s)	Change	Reason
4.4.3	72	Updated section reference with current plan. Made grammatical changes and added Port's Scientific Taking Permit renewed annually.	General update
4.4.4	72-73	Updated section reference with current plan.	General update
4.4.5	73	Altered section title to Oregon Administrative Rules 837-012-0305 to 0370 [Pest Control Fireworks Permit]. Updated information to match updated permit and section referencing with current plan.	General update
4.4.6	73	Added in The State of Oregon Airport Rules and how that regulates new storm water detention structures to restrict possible wildlife hazards.	
4.5	73-74	Made grammatical changes.	General update
4.5.1	74-75	Updated figure referencing with current plan. Removed Chapter 430, Environmental Zone Overlays and Chapter 248, Landscaping and Screening. Replaced with Chapter 33.565, Portland International Airport Plan District.	The designation of the Portland International Airport Plan District is new since the 2009 WHMP.
Figure 12. & Figure 13.	76-80	Updated from 2009 maps to 2018 maps with intentional blank pages separating.	General update
4.6	81-82	Updated to current permits and included reference to the location where permits are stored/maintained.	General update
4.7	83	Changed section title to Port of Portland Missions, Goals, & Policies. Grammatical changes to match the updated title.	General update
4.7.1	83-84	Grammatical changes. Removed Wildlife Hazard Management Program Goal figure on representing decision-making factors.	General update
Section 5	(85-86)	New section to the WHMP to describe resources to implement the plan.	Consolidated list added for increased readability
Section 6	(87-106)	Moved this section from 2009 WHMP section 5.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
Title	87	Changed title to Risk Management Procedures [14 CFR 139.337f (5)].	General update
6.1	87-88	Added where habitat management actions are addressed in the plan.	General update
6.1.1	88-90	Includes protocol, procedures, assessments, guidelines, and cooperation with the Oregon Air National Guard Bash Program to further describe WHMP equipment & resources.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
6.1.2	90-96	Updated equipment, techniques and protocols.	General update
6.1.3	96-97	Removed Wildlife Surveys section and switched with Raptor Trapping & Translocation. Equipment, techniques and protocol updated to current needs. Removed figures corresponding to 2009 WHMP version.	General update and increased readability
6.1.4	97	Switched with Hazing and Harassment section to Avian Nest Intervention.	General update and increased readability

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Table of Revisions 2009 - 2019

Reference	Page(s)	Change	Reason
6.1.5	97-101	Removed Raptor Trapping and Relocation section and switched with Lethal Action. Updated response and protocol to current needs. Updated section referencing with current plan.	General update and increased readability
6.2	101	Formerly section 5.3. Wording changes about future control measures.	Updated to include all control measures, not just non-lethal or non-toxic
6.3	102	Formerly section 5.4. Introductory paragraph added.	General update
6.3.1	102	Redirection to proper section addressing roles and responsibilities.	To match the plan update
6.3.2	102-106	Formerly section 5.4.2. Some grammatical changes. Addresses Airport Futures Master Plan.	Increased readability. Addresses airport plans implemented since last WHMP update.
Section 7	(107-114)	Description tactics for Monitoring, Evaluating and Reporting of wildlife data.	Restructured to increase readability
Section 8	(115-116)	Moved this section from 2009 WHMP section 6. Included more information on essential training for wildlife technicians both new and reoccurring and training conducted by supervision of an airport wildlife biologist.	Restructured to meet the request of the FAA to better align with 14 CFR 139.337
Section 9	117-118	Moved this section from 2009 WHMP section 7. Updated to the literature used/referenced in making the 2019 WHMP.	Restructured to increase readability

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APPENDIX B Wildlife Risk Evaluation Model

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Wildlife Risk Evaluation Model

Prepared for

Port of Portland
Portland International Airport

August 1, 2009

1.0 Risk Evaluation Process

The Port of Portland (Port) has identified a need to document the systematic approach that is used to assess wildlife hazards at the Portland International Airport (PDX), and prioritize actions based on the relative levels of risk they create. Documenting this systematic approach will provide a number of benefits to the Port, including:

- Creating a record that documents the need for, and affect from, future risk management decisions;
- Aiding in prioritization of risk management activities;
- Providing a greater understanding of the need for risk management decisions for internal stakeholders;
- Providing greater notice to internal and external stakeholders about potential risk management activities; and
- Ensuring a consistent ecosystem approach for all risk management actions.

The Port's approach has been developed using a number of sources and guidelines. The most important of these are the Federal Aviation Administration's (FAA's) 14 CFR Part 139 mandates, the work on risk analysis for bird strikes at airports conducted by Dr. J.R. Allan, and currently accepted concepts/methodologies for risk and decision-making. These influences and guidelines played the following role in development of the Port's systematic approach:

1) The Port has carefully crafted its risk management approach to address the criteria and mandates of the FAA's wildlife hazard regulations (14 CFR § 139.337). The data gathered, the documentation, the milestones and most importantly – the ultimate goal, have all been developed to be consistent with FAA standards. However, while the Port's systematic approach meets the FAA's criteria, the approach goes beyond the minimums set by the FAA where feasible and appropriate.

2) Dr. J. R. Allan, Central Science Laboratory, Birdstrike Avoidance Team, United Kingdom, has prepared a conceptual risk assessment approach for use in the management of bird hazards at airports (Allan 2000). Dr. Allan's work has provided an excellent foundation for the Port's development of its own systematic approach. Although the Port has substituted bird strike data from the United States for the data Dr. Allan uses from the United Kingdom, Dr. Allan's work has otherwise been closely followed in creating a risk assessment model for PDX.

The risk evaluation/management approach created from these influences and guidelines has been integrated into the Port's existing decision-making framework and resource management structure. The following sections describe the preliminary approach that has developed from the combination of these various elements. It is expected that the Port's risk evaluation/management approach will evolve over time as new information or feedback becomes available.

Definitions

The Port's risk evaluation/management methodology must reconcile a number of elements, including:

- Regulations and requirements of the FAA;
- The needs and expectations of the Port's internal stakeholders; and
- The established science behind the reduction of hazards in current literature.

All of these elements rely on their own definitions for key terminology. In order to produce a document to satisfy all concerned, agreed upon definitions have been developed and are listed in this section to avoid potential confusion.

For purposes of the Port's wildlife hazard risk evaluation/management strategy, the following terms have been defined to have the following agreed upon meanings:

Wildlife Hazard - The FAA defines "Wildlife Hazard" as, "[t]he potential for a damaging aircraft collision with wildlife on or near an airport."

Hazard - Wildlife in a location, number, and/or with a behavior that gives it the potential for striking an aircraft.

Risk Evaluation – A determination of the level of risk that exists for a particular wildlife species to produce a damaging aircraft collision based on the anticipated severity of impact and probability of occurrence.

Probability - The likelihood that an adverse event, (i.e., a collision involving an aircraft and wildlife), will occur at PDX.

Impact – The likely severity of the damage that will occur to an aircraft if a collision occurs with wildlife on or near an airport.

Risk Evaluation Model (REM) – The methodology used by the Port to make an evaluation of risk as well as decisions with regard to managing that risk.

2.0 PDX Hazards

The first step in the process of evaluating wildlife risk at PDX is to identify wildlife that could create a potential hazard. The Port maintains a comprehensive list of all wildlife known to frequent the PDX area or that has been observed at the airport during daily operations. A Wildlife Hazard Assessment has also been completed that identifies habitats that could attract wildlife to PDX. This assessment is validated with a database of the species struck at PDX has been kept since 1996. [The current list is contained within Appendix A of the Wildlife Hazard Management Plan (WHMP).] These three sets of data provide an increasingly detailed look at the species that may create hazards for aircraft at PDX. The data from the list of species struck at PDX is the basis for the risk evaluation process that is outlined in section 3.0.

The overall objective of the PDX wildlife hazard management program is to develop an integrated and adaptive program to effectively manage risk at PDX by reducing the probability of occurrence of wildlife/aircraft collisions.

3.0 Risk Evaluation

Based on the work of Dr. J.R. Allan, the Port has adopted a model for risk evaluation that determines potential risk and sets priorities for risk management actions by combining the calculation of the probability of a strike with a particular species and the potential severity of the impact associated with striking that species. For purposes of the model, the Port measures "severity of impact" and "probability of occurrence" as follows:

3.1 Determining Severity of Impact

The Port has defined "impact" as "[t] he likely severity of the damage that will occur to an aircraft if a collision occurs with wildlife on or near an airport." To assess the likely severity of a collision with a given species, the Port uses United States national strike data indicating the proportion of strikes with the species that have resulted in damage to the aircraft struck. The greater the percentage of strikes resulting in damage, the greater the potential "severity of impact" for the species in the Port's risk evaluation matrix. The potential severity of impact portion of the matrix is divided into five decreasing levels of severity based on the respective decreases in percentages as shown in the following table:

Percentage of strikes causing damage (*based on United States national data***)**	>20%	10-20%	6-9.9%	2-5.9%	0-1.9%
Severity category	Very High	High	Moderate	Low	Very Low

As a check on this process, the Port maintains an AIRMAN database that tracks wildlife strike occurrences by species and includes information on whether there was damage associated with the strike. If there are species for which Port data tracking shows significant variance with national data, then Port staff will evaluate whether the local data warrants a change in the potential severity of impact status for that species.

3.2 Determining Probability of Occurrence

The Port has defined "probability" as the likelihood that an adverse event, (i.e., a collision involving an aircraft and wildlife), will occur at PDX. Based on the work of Dr. Allan, the likelihood is measured using airport specific data for bird strikes at PDX. As with the severity of impact evaluation, the probability of a strike occurring is divided into five categories ranging from very high to very low. A particular species placement in a probability category is based on the number of strikes per year for that species averaged over a five-year period, as shown in the following table:

Average Number of Strikes per year *(based on PDX data)*	>10	3-10	1-2.9	0.3-0.9	0.2-0
Probability category	Very High	High	Moderate	Low	Very Low

As an example a table providing bird strike data from 1999 – 2003 is included in attachment A.

3.3 Making a Risk Evaluation

Using Dr. Allan's methodology, the Port has combined the respective tables for "probability of occurrence" and "severity of impact", to create the following risk evaluation matrix:

		PROBABILITY OF OCCURRENCE				
		Very High	**High**	**Moderate**	**Low**	**Very Low**
SEVERITY OF IMPACT	**Very High**	3	3	3	3	2
	High	3	3	3	2	2
	Moderate	3	3	2	1	1
	Low	2	2	1	1	1
	Very Low	1	1	1	1	1

Species that have been struck at PDX are placed into the appropriate place in the matrix based on the respective axis i.e. probability or severity. Species placed in the portion of the risk evaluation matrix shown in red are considered priority species for which the Port will implement an immediate action plan. Those species falling within the yellow portion of the matrix are species that are of lesser concern than the red species, but still may require management actions. Those species falling within the green portion of the matrix are species that warrant monitoring. Attachment A contains the completed matrix reflecting the current year's data, as well as the supporting data used to generate the matrix.

4.0 Risk Management

Risk management for wildlife strikes at airports focuses primarily on reducing the probability that an impact will occur. Although there are a number of factors that can affect the extent of damage from an animal or flock of birds striking an airplane, none of these factors are within the ability of the Port to influence. Examples of these factors include:

1) Size of the animal;
2) Shape of the animal;
3) Weight (or mass) of the animal;
4) The typical impact speed of the animal and the aircraft;
5) In the case of birds, the size of a flock and the density of the birds within that flock;
6) The location of the strike along the aircraft flight path; and
7) The part of the aircraft that is struck

These factors are tied more to chance and intrinsic physical factors that are beyond the direct management control of the Port.

Accordingly, the Port focuses its risk management activities upon reducing the potential for a strike to occur. To understand the factors that influence the potential that a particular species will be involved in a collision with aircraft at PDX, the Port relied heavily on the work of Dr. J.R. Allan. Based on Dr. Allan's work, the Port risk management process identifies a number of factors that are relevant to the probability of a particular species being involved in a damaging impact with aircraft, including the wildlife's location, behavior and numbers. The location, behavior and numbers of wildlife are in turn influenced by a number of factors. The following chart illustrates the primary factors that affect probability of occurrence and the influences that affect those factors.

LOCATION

Feeding Habitat | Breeding Habitat | Cover/Resting Habitat | Habitat Distance | Habitat Configuration

BEHAVIOR

Feeding Behavior | Breeding/Territorial Behavior | Resting/Cover Behavior | Escape/Avoidance

WILDLIFE NUMBERS

Feeding Opportunity | Cover/Resting Opportunity | Breeding Opportunity

AIRPORT OPERATIONS

Mowing Regime | Airfield Disturbance | Construction Activity | Runway Operations

For the Port's risk evaluation/management process, information on all of the factors and influences noted above are being collected, both relative to the wildlife species of concern and, where relevant, to the conditions at the airport. The following text provides a description of the types of information and the level of detail being included as the Port tracks these data.

Location

The probability of a damaging aircraft strike is influenced by the species and number of wildlife and the frequency with which they are drawn into the flight path of aircraft at PDX. Information about the life history requirements for each of the species has been gathered through the use of the Johnson and O'Neil regional habitat classifications. These regional classifications are then refined to the site-specific local habitat classifications through the Port's Natural Resource Assessment and Management Plan. Then the Port has used the local habitat types to build associations with the natural and artificial habitats present at PDX and how they meet the life history requirements for species at PDX. A visual representation showing the local habitat types and the wildlife that use these areas is illustrated in the mapping of management areas in the WHMP that shows areas with similar habitat and wildlife issues.

Behavior

How the various wildlife species behave is a very relevant factor in determining the probability of individual wildlife being at the wrong place at the wrong time. For instance, while feeding habitat may exist for several species at an airport, one species may hunt by stalking around the perimeter of the airfield, while others hunt by soaring over the airfield. In the very limited context of feeding behavior, the species that feed in flight or hunt while towering or and soaring have an increased potential for being at the wrong place at the wrong time.

This information is augmented by the Port wildlife staff's knowledge of site-specific conditions for the species at the airport. This includes any regional variations, any seasonal variations in habitat or species presence, as well as unique behavioral patterns prompted by PDX's geographic context. The site-specific variation is particularly relevant to the escape/avoidance tendencies within species. For instance, the behavior of juvenile birds is often different than that of adult birds, and resident birds may exhibit more "savvy" behavior around aircraft than birds encountering the airfield for the first time.

Wildlife Numbers

Land uses or management actions on or around the airport can influence the attractiveness of the area to species of concern for aviation. Accordingly, features of the environment that may lead to the increase or decrease in the number of individuals of that wildlife species may change the probability that a wildlife strike will occur. These features of habitat function and value are considered opportunities for wildlife and for this analysis are grouped into feeding, resting and protection, and breeding opportunities. Opportunities are species-specific characteristics.

Feeding opportunity provides an example of how the various opportunities can influence the probability that a strike will occur. Feeding opportunities for a particular species are those primary characteristics that (1) increase the abundance, quality and distribution of the food base, and (2) increase the availability of the food base. These may include optimal forage conditions or optimal habitat for a particular prey species. Increased forage or prey may not increase wildlife numbers unless the food source is readily accessible. Any features or activities that would increase the availability of forage or prey will increase feeding opportunity.

There are also seasonal variations in the number of species that occur at PDX, based on migration season, dispersion of juvenile birds, or other factors.

Airport Operations

In addition to the ecosystem conditions discussed above, the management and maintenance operations of the airport itself can influence the potential for a bird strike. For instance, short grass habitat is better suited to the feeding behaviors of some of the wildlife species of concern found at PDX. Accordingly, the mowing regime followed by the maintenance staff can affect the suitability of a given location as feeding habitat.

The mowing regime for the airport is a factor that the Port can control, within certain parameters. However, there are other factors that are relevant to determining the probability of an impact that are outside the control of the Port. For instance, because of the prevailing winds, aircraft at PDX tend to take off to the west during summer months and to the east during winter months. Because aircraft have greater

vulnerability during take-off than during landing, the relevant location for the influence factors that affect bird strikes will tend to shift seasonally as take-off direction shifts.

Other airfield conditions will also change the species and number of birds that frequent the airfield. Construction activity will often draw birds to the area, especially if dirt moving, hydroseeding, or watering activities are involved. These activities may be unavoidable, but the hazard can be mitigated by awareness of the issue and increased hazing in response.

4.1 Process for Risk Management Decision Making

The Port is committed to developing a process for risk management in a comprehensive, well-documented and systematic manner. The primary challenge associated with reaching this goal is the overwhelming quantity and complexity of the data that is relevant to the decision making process.

For example, in the species behavior discussion above, it was noted that consideration of feeding behavior is important. The discussion noted that whether the presence of feeding habitat for a species is relevant depends in part on whether the species feeds in a manner that could create a conflict with aircraft. However, this is only the beginning of the consideration. Having feeding habitat that is used in a relatively safe manner (i.e., stalking) could still cause an increase in probability in other ways (e.g., feeding and nesting habitats are located in a configuration that results in species crossing runways frequently to access hunting grounds).

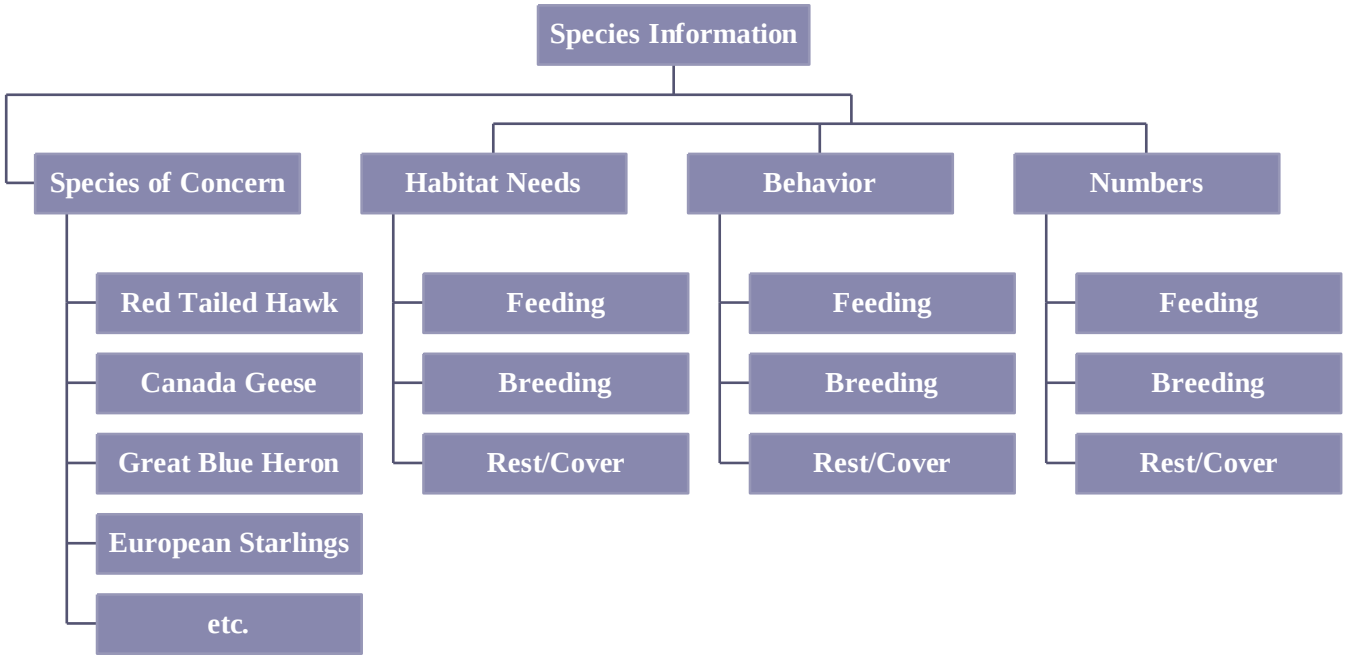
These complex interrelationships of the various ecosystem and operational factors make it impossible to consider the factors in isolation. To deal with this obstacle, the Port is creating two tools that are designed to help organize and aid in analysis of the relevant data.

4.1.1 Organizing Data

The first tool the Port has adopted is the Brain Enterprise Knowledge Platform™ software to help store, organize and understand the relationships within the relevant ecosystem and operational factors identified above.[1] The existing data concerning species habitat needs, behavioral patterns and opportunities for species abundance, as well as known conditions and operational information for PDX, have been input into the Brain program. The brain organizes the data and shows the potential relationships that exist and must be considered for each particular influence. The species-specific data that has been input into the Brain has been organized into the following general categories shown in Table 1:

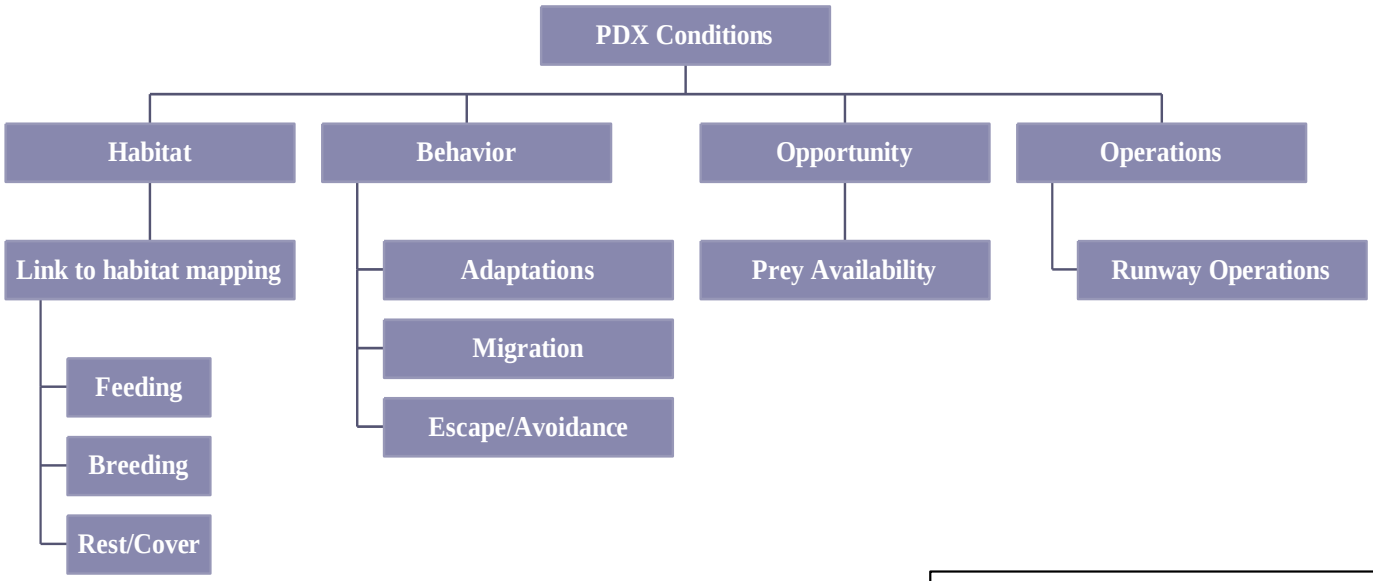
[1] Some relevant operational activities such as mowing are not currently being tracked within the Brain database because they are ongoing, irregularly timed processes. Because they are ongoing and irregular, keeping the database up to date would require excessive maintenance.

Table 1. Species Information



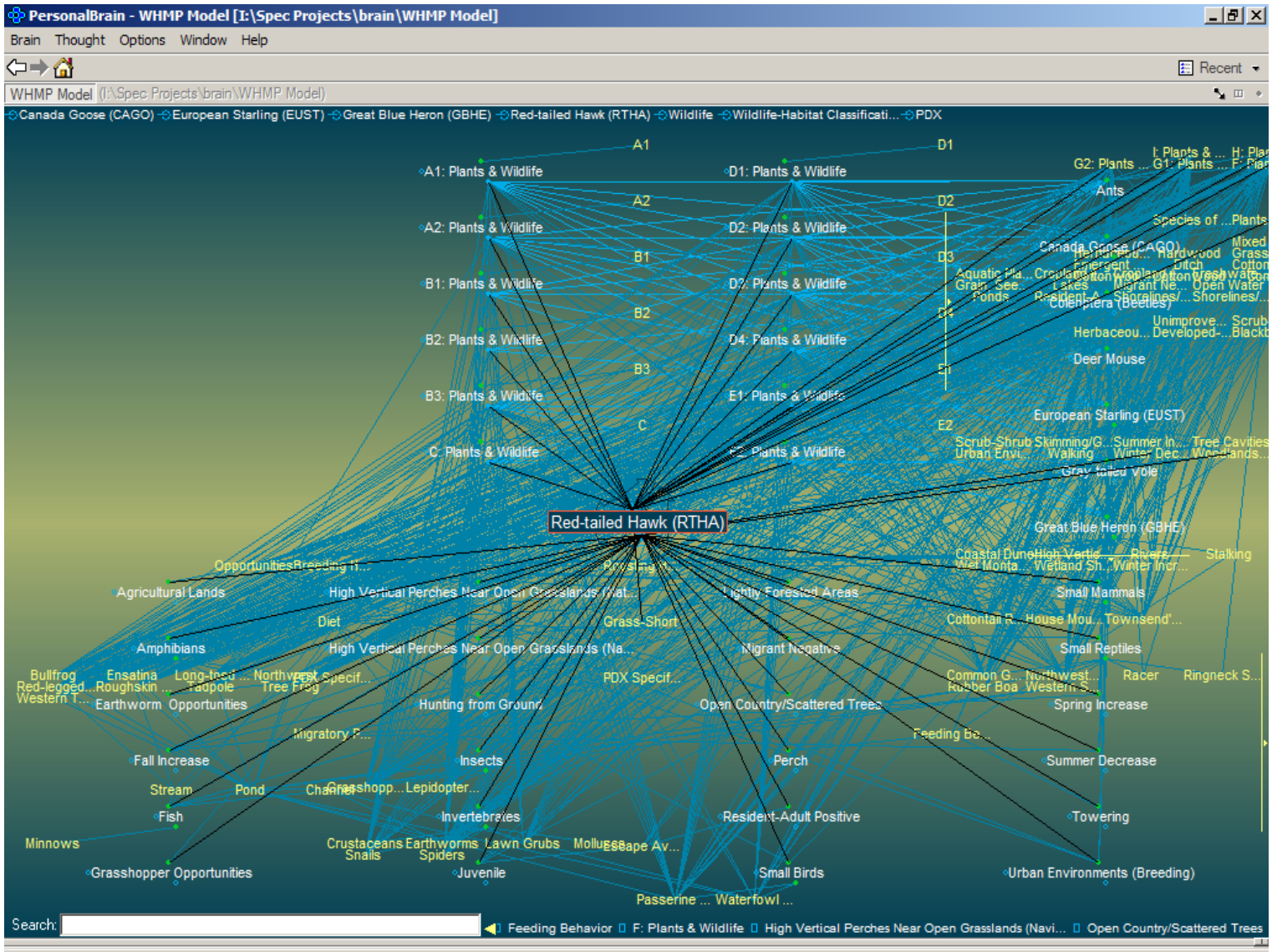
In addition, information has been entered into the Brain for PDX specific conditions, which has been organized in the following general categories shown in Table 2:

Table 2. PDX Specific Conditions



When entered into the Brain, all of the connections and interrelationships between the various categories of data are shown. Figure 1 shows an example of how the data may appear on the screen when using the Brain. The example shows some of the other ecosystem or operational factors that are primary influences upon red-tailed hawks.

Figure 1. ***The Brain computer model's representation of red-tailed hawk influences and pathways.***



The numerous lines forming a complex spider-web behind the data on screen represents connections between the primary influences and other data stored within the Brain that are linked to those primary influences. As the user clicks on relevant data, the view shifts to show the ecosystem or operational

factors that have primary linkages to that piece of data. This allows the user to identify the associations relevant to the management scenario.

4.1.2 Evaluating Data

Although the Brain is a great tool for storing and organizing data, the Brain holds too much information and too many relationships to understand without a guide. Accordingly, the Port is developing a pathway guide that helps users deal with the amount and complexity of the information within the Brain. The guide will consist of a list of questions with instructions to guide the user to the location in the Brain to answer the question. Each question is accompanied by follow up questions that guide the user through an evaluation of linked information that should also be considered.

By using the pathway guide or key, the data and relationships stored in the Brain can be queried with a specific focus towards the role of the respective habitat elements on increasing or decreasing probability of impacts. This allows evaluation of risk management options, as well as consideration of the consequences of those options. The pathway guide is the means of making the brain think. By walking the user step by step through the information contained in the Brain, the guide ensures that the analysis is consistent, comprehensive and well documented.

4.1.3 Risk Management Decision Making

In the end, best professional judgment is the ultimate basis for the decisions made using the Brain and the accompanying pathway guide. However, the Brain and the pathway guide give the best professional judgment structure, legitimacy, and credibility. These tools guide the species-specific management strategies. The pathway guide form will also serve as the documentation to support and justify the risk management determination that is made.

5.0 Conclusion

The REM and risk management process are anticipated to continuously evolve as the information available for the Brain is refined and improved. In addition, the pathway guides are easily adaptable to incorporate improvements in the understanding of ecosystem functions, risk theory, or wildlife hazards. Accordingly, the REM is expected to be in a continuous state of feedback and adaptation for at least several years. Nonetheless, based on preliminary use and evaluation of the Risk Evaluation Model, the Port believes that the model already provides the following elements to wildlife hazard management at PDX:

- Improved documentation of the Port's overall wildlife hazard management approach;
- Clear identification of the species that pose a hazard at PDX;
- Defined methodology for prioritizing management actions based on risk evaluation;
- Increased standardization and documentation of hazard management decision making;
- Improved ability to justifying hazard management decisions (both internally and externally);
- More certainty that risk management analysis will be comprehensive; and
- Increased support for risk management planning (e.g., identifying needs, prioritizing, targeting issues, etc.).

6.0 Literature Cited

Allan J.R. *Birdstrike Assessment Model*. Central Science Laboratory. Sand Hutton, York. 2003

Allan, J.R. *A Protocol for Bird Strike Risk Assessment at Airports*. International Bird Strike Proceedings 25: 29-46. 2000

Allan, J.R. The Use of Risk Assessment in Airport Bird Control. Birdstrike Avoidance Team – Central Science Laboratory. Sand Hutton, York. 2000

Johnson, David H. and Thomas A. O'Neil. *Wildlife-Habitat Relationships in Oregon and Washington.* Corvallis: Oregon State University Press. 2001.

Attachment A

Example PDX Risk Evaluation Model
& Supporting Data

PDX RISK EVALUATION MODEL
(1999-2003 Data)

SEVERITY OF IMPACT	PROBABILITY OF OCCURRENCE				
	Very High	**High**	**Moderate**	**Low**	**Very Low**
Very High		Mallard Duck (S)		Canada Goose (S) Great-horned Owl (S) Osprey (⇧)	Green-winged Teal (S) Pintail (S) Turkey Vulture (S) Wood Duck (S) [Bald Eagle] (S) [Deer] (S)
High	Red-tailed Hawk (S)	Blue Heron (S) Gull spp. (S)	Rock Dove (S) American Crow (⇧)		
Moderate		Barn Owl (S) European Starling *	Coyote✦		
Low				Northern Harrier (S) Short-Eared Owl (S)	Killdeer (S)
Very Low		American Kestrel (S) Swallow spp. (S)			

*Severity of European Starling was moved up from Low to Moderate due to strikes with multiple birds.
✦ Coyote was shifted from low to moderate probability due to frequency of sightings and impacts to movement areas.
▪ [Bracketed species] indicate species that have not been struck at PDX, are present in the area, and have a high enough severity potential to warrant being added to the model.

S= Same status as last year's model
⇧ = Higher severity than last year's model
⇩ = Lesser severity than last year's model

References:

Model based on: Allan, J.R. "Birdstrike Assessment Model." Central Science Laboratory. 2003.
Strike Data for U.S. Airports used instead of U.K. data. This data came from: FAA National Wildlife Strike Database. "Wildlife Strikes to Civil Aircraft in the United States 1990-2002. June 2003.

1999-2003 - PDX Wildlife Strikes						Avg per year 5 yrs (1999 - 2003)
	1999	*2000*	*2001*	*2002*	*2003*	
American Crow	1	2			2	**1**
American Kestrel	2	7	13	12	6	**8**
Barn Owl	13	7	8	10	7	**9**
Geese (Brant's/Canada)	1		2		1	**0.8**
Common Snipe		2				**0.4**
Coyote	1				1	**0.4**
Doves & Pigeons	1	2	4	2	1	**2**
European Starling	8	5	3	4	1	**4.2**
Goldfinch			1			**0.2**
Great Blue Heron	4	3	9	1	2	**3.8**
Great Horned Owl				2		**0.4**
Green-Winged Teal				1		**0.2**
Gulls	5	7	5		2	**3.8**
Killdeer		1				**0.2**
Mallard Ducks	4	5	8	1	1	**3.8**
Meadowlark						**0**
Nighthawk		1				**0.2**
Northern Harrier	1	1				**0.4**
Osprey				1	2	**0.6**
Parakeet	1					**0.2**
Pintail Duck				1		**0.2**
Redtail Hawk	10	5	12	18	10	**11**
Robin			1			**0.2**
Short-Eared Owl			1		1	**0.4**
Sparrow			1	2		**0.6**
Swallows	1	15	8	11	5	**8**
Swift	3		1			**0.8**
Turkey Vulture	1					**0.2**
Unknown	19	14	9	7	6	**11**
Wood Duck				1		**0.2**
Western Grebe			1			**0.2**
Unconfirmed Totals:	76	77	86	73	48	
Confirmed Totals:	60	63	70	72	49	

PDX Wildlife Species of Concern	PDX Monitor Wildlife Species
Red-tailed hawk	Bald eagle
Osprey	Turkey vulture
Barn owl	Green-winged teal
Great horned owl	Northern pintail
Canada goose	Wood duck
Mallard	Coyote
Great blue heron	Black-tailed deer
Gulls	
European starling	
Rock dove	
American crow	

APPENDIX C Prioritized List of Actions Tables

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Prioritized List of Actions- 2013 to Current (last updated: Feb 2019)

Management Action	Type	Description	Project/ Activity	Priority	Target Date/ Frequency	Completion Date	Management Area
Wildlife Monitoring	Avian Point Count	Weekly point count surveys are performed as part of the ongoing WHA to document species of concern.		Low	Weekly	Ongoing	A1, A2, D6
	Small Mammal Survey	Quarterly small mammal surveys are completed to document prey species on the airfield as part of the ongoing WHA.		Low	Quarterly	Ongoing	A1, A2
	Daily Airfield Patrols	PDX Wildlife Staff patrol the airfield 16 hours/day every day of the year. Observation and action data is recorded into an electronic database for trackability and analysis.	Airfield Management	High		on going	All
	Nest Monitoring	Port property is monitored for nesting activity by species of concern. Nests are removed when appropriate and special projects are implemented to modify habitat where possible.		High		on going	All
	SHLA Monitoring	Monitor Port property and document use by streaked horned larks to ensure compliance with the ESA.		High		on going	A1, A2, G2
	RTHA GPS Telemetry	Affixed GPS telemetry units on several RTHA's to gain better understanding of their movements after translocation.		Low		on going	A1, A2

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Management Action	Type	Description	Project/ Activity	Priority	Target Date/ Frequency	Completion Date	Management Area
Vegetation Management	Discing	Discing breaks up vegetation which helps to minimize foraging by geese on new grass growth.		High	Annual	Ongoing	G2
	Mowing	The RSA is mowed at night to reduce insectivore strikes. Coordination of mowing inside and outside of the fence is done to help draw species of concern off of the airfield.	Airfield Management	Mod	As Needed	Ongoing	A1, A2
	Trees	Thin trees so they meet the PDX landscaping standard spacing requirements and prune branches that may provide nesting surfaces.		Mod	As Needed	Ongoing	All
	PDX Landscape Standard	Maintain and implement landscape standards that reduce the attractiveness of the airport to wildlife species of concern and eliminate the vertical intrusion of vegetation into aircraft operating airspace while retaining an aesthetically pleasing landscape.	Compatible Land-use planning	High	2007	ongoing	Airport Plan District
	Herbicide	Broadleaf herbicide applied as necessary to reduce foraging opportunity for prey species.	Airfield Management	Mod	As Needed	Ongoing	A1, A2
Water	PDX Stormwater Management Plan	Implement the recommendations in the PDX Stormwater Master Plan [which follows Advisory Circular 150/5200-33B on Stormwater Management] to ensure that stormwater facilities do not provide wildlife habitat.	SWMP	Mod	As Needed	Ongoing	All

Management Action	Type	Description	Project/ Activity	Priority	Target Date/ Frequency	Completion Date	Management Area
Management	Wet Areas Survey & Management	Monitor the airfield for areas of standing water that attract wildlife; develop and implement plans to address areas of concern.	Habitat Management	High	Annual	Ongoing	All
		Standing water identified in an undeveloped area that is attracting large numbers of species of waterfowl.	Habitat Management	High	summer of 2019	TBD	D-1
Airport Infrastructure (FAA)	Project Development Reviews	Provide input for projects on and around PDX at all stages to promptly address any potential wildlife hazard issues.	PACR, Airport Way Tree Removal	Mod	As Needed	Ongoing	All
Compatible Land-Use Planning (Airport Plan District)	PDX Landscape Standards, Storm Water Management	Review project plans on and around the airport to ensure that new landscaping and stormwater facilities do not create an attractant for hazardous wildlife	Compatible Land-use planning	High	As Needed	Ongoing	Airport Plan District
	Trees	Economy lot E-Zone was converted from forest to scrub shrub habitat.	Economy Lot	High		2015	B3
Non-lethal Control Measures	Exclusion	Maintain coyote exclusion fencing.	Perimeter Fencing	High	As Needed	Ongoing	A2
		Maintain retention pond exclusion netting.	Retention Pond netting	Mod	As Needed	Ongoing	A2
		Maintain roadway canopy exclusion netting.	Canopy Bird netting	High	As Needed	Ongoing	A1, A2
		Reduce gaps in airfield gates to prevent terrestrial mammals from entering the airfield.	Vehicle gate mods	High	As Needed	Ongoing	A2
	Deterrents	Install wildlife deterrents as necessary to prevent nesting and perching on airfield infrastructure.	Spinners	High	As Needed	Ongoing	A2
			Bird balls	High	As Needed	Ongoing	A1, A2
			Tilt devices	High	As Needed	Ongoing	H, I, C
			Visual Barriers	High	As Needed	Ongoing	C, I, H, K1, K2
			Fogger	Low	As Needed	Ongoing	A1, A2

Management Action	Type	Description	Project/ Activity	Priority	Target Date/ Frequency	Completion Date	Management Area
Non-lethal Control Measures			Spikes on Airfield signs	Mod	As Needed	Ongoing	A1, A2
	Hazing/Harassment	Clear critical air space for imminent aircraft movement.	Pyrotechnics	High	As Needed	Ongoing	A1, A2, D1, E1, E2, G1, G2, H, I, K2
			Lasers	High	As Needed	Ongoing	All
			Paintballs	Mod	As Needed	Ongoing	A1, A2, E1, E2, G1, G2, I
			Dogs	Mod	As Needed	Ongoing	C, D1/2/3/4/6, G1/2, H, I, K1/2
	Enhanced Detection	Allows detection of hazardous wildlife after dark.	Thermal Optics	Mod	As Needed	Ongoing	All
	Trapping/Translocation	Raptors are targeted for capture, banding, and translocation. Other species such as European starlings and Pigeons are trapped and euthanized as needed.	Bal-Chatri Trap	Mod	As Needed	Ongoing	A1, A2
			Goshawk Trap	Mod	As Needed	Ongoing	A1, A2
			Starling Trap	Mod	As Needed	Ongoing	A1, A2
			Nest Box Trap	Mod	As Needed	Ongoing	A1, A2
			Net Gun	Mod	As Needed	Ongoing	A1, A2
			Pigeon Trap	Mod	As Needed	ongoing	A1, A2, C
Lethal Control	Firearms	Used for lethal removal when non-lethal methods have proven ineffective and the wildlife hazard continues to present an imminent strike risk to aircraft.	Shotgun	Mod	As Needed	Ongoing	A1, A2
			Air Rifle	Mod	As Needed	Ongoing	A1, A2
			.22 Rifle	Mod	As Needed	Ongoing	A1, A2
			Captive Bolt Stunner	Mod	As Needed	Ongoing	A1, A2
	CO2	Used for lethal removal of trapped starlings and injured birds.			As Needed	Ongoing	A1, A2
	Pesticide	Applied according to label instructions to reduce prey base for insectivores.	Dimilin	Mod	As Needed	Ongoing	
			Carbaryl	Mod	As Needed	Ongoing	A1, A2

Management Action	Type	Description	Project/ Activity	Priority	Target Date/ Frequency	Completion Date	Management Area
	Rodenticide	Applied according to label instructions to reduce prey base for raptors and other animals that feed on rodents.	Zinc Phosphide	Mod	As Needed	Ongoing	A1, A2
Special Projects	Wetland fill	Piped and filled wetlands to reduce wildlife habitat on the airfield.	Guard Base Keyhole Wetlands	High		2015	A-2
	Site Conversions	Conversion from stand of cottonwood trees to lower growing shrubs	Economy Lot E-zone	High		2015	B-2
		Conversion from an emergent wetland to a scrub shrub wetland to make it less attractive to wildlife species of concern.	Cascade Station	High		2011	D-1
		Northern portion of Colwood Golf Course was developed into a US Postal Hub. Wetlands were removed and mitigated further away from the airfield.	Colwood Golf Course	High		2015	D6

FEDERAL AVIATION ADMINISTRATION

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APPENDIX D *14 CFR § 139.337 Wildlife Hazard Management*

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§139.337 Wildlife hazard management.

(a) In accordance with its Airport Certification Manual and the requirements of this section, each certificate holder must take immediate action to alleviate wildlife hazards whenever they are detected.

(b) In a manner authorized by the Administrator, each certificate holder must ensure that a wildlife hazard assessment is conducted when any of the following 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. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;

(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 described in paragraphs (b)(1), (b)(2), or (b)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.

(c) The wildlife hazard assessment required in paragraph (b) of this section must be conducted by a wildlife damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual. The wildlife hazard assessment must contain at least the following:

(1) An analysis of the events or circumstances that prompted the assessment.

(2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.

(3) Identification and location of features on and near the airport that attract wildlife.

(4) A description of wildlife hazards to air carrier operations.

(5) Recommended actions for reducing identified wildlife hazards to air carrier operations.

(d) The wildlife hazard assessment required under paragraph (b) of this section must be submitted to the Administrator for approval and determination of the need for a wildlife hazard management plan. In reaching this determination, the Administrator will consider—

(1) The wildlife hazard assessment;

(2) Actions recommended in the wildlife hazard assessment to reduce wildlife hazards;

(3) The aeronautical activity at the airport, including the frequency and size of air carrier aircraft;

(4) The views of the certificate holder;

(5) The views of the airport users; and

(6) Any other known factors relating to the wildlife hazard of which the Administrator is aware.

(e) When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder must formulate and implement a plan using the wildlife hazard assessment as a basis. The plan must—

(1) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations;

(2) Be submitted to, and approved by, the Administrator prior to implementation; and

(3) As authorized by the Administrator, become a part of the Airport Certification Manual.

(f) The plan must include at least the following:

(1) A list of the individuals having authority and responsibility for implementing each aspect of the plan.

(2) A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion:

(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.

(4) Identification of resources that the certificate holder will provide to implement the plan.

(5) Procedures to be followed during air carrier operations that at a minimum includes—

(i) Designation of personnel responsible for implementing the procedures;

(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;

(iii) Wildlife hazard control measures; and

(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower.

(6) Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in paragraphs (b)(1), (b)(2), and (b)(3) of this section, including:

(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.

(g) FAA Advisory Circulars contain methods and procedures for wildlife hazard management at airports that are acceptable to the Administrator.

APPENDIX E *142nd Fighter Wing, Oregon Air National Guard Bird Aircraft Strike Hazard (BASH) Plan 91-212*

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142nd Fighter Wing
Oregon Air National Guard
Bird/Wildlife Aircraft Strike Hazard (BASH)
Plan 91-212

Portland ANG Base, OR

March 2017

FEDERAL AVIATION ADMINISTRATION

JUN 28 2019

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DEPARTMENT OF THE AIR FORCE
142d FIGHTER WING (ACC)
PORTLAND AIR NATIONAL GUARD BASE OREGON

3 March 2017

MEMORANDUM FOR 142 FW

FROM: 142 FW/CC

SUBJECT: 142d FIGHTER WING (142 FW) BIRD AIRCRAFT STRIKE HAZARD (BASH) PLAN 91-212

1. Attached is the 142 FW BASH plan providing guidance for bird aircraft strike hazard reduction at Portland Air National Guard Base, Portland, Oregon. This plan is effective upon receipt. This document is UNCLASSIFIED; however, it is FOR OFFICIAL USE ONLY in accordance with AFI 37-131.

2. Tasked organizations will develop checklists for implementation procedures and forward them to wing safety for review. Additionally, those organizations will annually review the plan, update it as needed, and forward comments to 142 FW/SE as necessary.

3. The National Environmental Policy Act (NEPA) of 1969 requires the Federal government to consider the environmental consequences for Federal undertakings. The Council on Environmental Quality (CEQ) is the Federal agency charged with implementing NEPA. Air Force Instruction 32-7061, *The Environmental Impact Analysis Process,* promulgates CEQ regulations and DoD directives for NEPA compliance within the Air Force and the Air National Guard. The environmental consequences for an updated installation Bird Aircraft Strike Hazard (BASH) Plan were carefully considered and there are no adverse environmental impacts. The environmental analysis for the updated BASH Plan is consistent with Categorical Exclusion (CATEX) A2.3.7 in AFI 32-7061 (32 CRF 989): "Continuation or resumption of pre-existing actions, where there is no substantial change in existing conditions or existing land uses and where the actions were originally evaluated in accordance with applicable law and regulations, and surrounding circumstances have not changed." The provisions in NEPA and requirements of AFI 32-7061 have been fulfilled. No further environmental analysis is required and neither an environmental assessment nor an environmental impact statement will be prepared.

4. If there are any questions, please contact 142 FW/SE, DSN 638-4024, usaf.or.142-fw.list.fal-se-chief-of-safety@mail.mil. See Distribution List (ANNEX F).

DUKE A. PIRAK, Colonel, ORANG
Commander

FEDERAL AVIATION ADMINISTRATION
JUN 28 2019
CLJ
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142 FW BASH Plan 91-212

SECURITY OF INSTRUCTION

1. The long title of the plan is 142d Fighter Wing Bird/Wildlife Aircraft Strike Hazard (BASH) Plan 91-212. The short title is 142 FW BASH Plan.

2. This document is UNCLASSIFIED. Handle in accordance with Air Force Directives.

3. This document does not contain information affecting the national defense of the United States.

SUMMARY OF CHANGES

Change 1. The following provides a summary of the 142 FW BASH Plan revisions resulting from the NGB/SEF BASH Site Visit Conducted at Portland International Airport (PDX) from 25 July to 27 July 2016.

1. The 142 FW BASH Plan text was revised to reflect current wildlife hazard management activities and the roles and responsibilities of implementing the plan.

2. A summary of recommendations from the 2016 BASH Site Visit is provided in Section 3 of the 142 FW BASH Plan. The full BASH Site Visit Assessment and Recommendations report is provided in APPENDIX 1.

3. Multiple Annexes and Appendices were updated to reflect current and necessary information. Multiple Annex items were removed from the previous version due to applicability and necessity to be included in the plan.

4. Changes to the BASH Plan and annual reviews shall be recorded on the following page.

RECORD OF CHANGES

Change Number	Date of Change	Date Entered	Posted By
1	16 Sept 2016		NGB BASH Team
2	3 Mar 2017		Lt Col Christensen

RECORD OF ANNUAL REVIEW

Reviewed By	Date Reviewed	Remarks

142 FW BASH Plan 91-212

PLAN SUMMARY

1. Definition and Purpose. The term BASH refers to the program aimed at controlling and minimizing the collision potential between aircraft and wildlife in and around the immediate vicinity of military airfields and training areas. The purpose of this plan it to provide an active program to minimize bird and other wildlife strikes to aircraft at the Portland International Airport (PDX) Joint Use facility.

2. Conditions for Execution. This plan is based on hazards from both resident and seasonal bird populations as well as for other species of wildlife. Implementation of specific portions of the plan is continuous, while other portions will be implemented as required by bird or other wildlife activity.

3. Operations to be Conducted:

a. Specific operations include:

(1) Establishment of a Bird Hazard Working Group (BHWG).

(2) Procedures for reporting hazardous bird activity and altering or discontinuing flying operations.

(3) Provisions to disseminate information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance.

(4) Procedures to eliminate or reduce environmental conditions that attract birds and other wildlife to the airfield.

(5) Procedures to disperse birds and other wildlife from the airfield.

b. Tasked organizations: As listed in ANNEX A.

c. Supporting documents: Functional areas will develop operational instructions or checklists as required to support this plan.

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCESA	Air Force Civil Engineer Support Agency
AFCESA/CESM	AFCESA, Mechanical/Electrical Engineering Division, Pest Management
AFI	Air Force Instruction
AFM	Air Force Manual
AFPAM	Air Force Pamphlet
AFSAS	Air Force Safety Automated System
AFSC	Air Force Safety Center
AFSC/SEFW	Air Force Safety Center, Flight Safety, Wildlife (BASH Team)
AGL	Above Ground Level
AHAS	Avian Hazard Advisory System
ANG	Air National Guard
AM	Airfield Manager
AOA	Airport Operating Area
ATC	Air Traffic Control
ATIS	Automatic Terminal Information Service
AWOS	Automated Weather Observing System
BAM	Bird Avoidance Model
BASH	Bird/Wildlife Aircraft Strike Hazard
BCE	Base Civil Engineer
BHWG	Bird Hazard Working Group
CCTV	Closed Circuit Television
COE	Corps of Engineers, US Army
DC	Detachment Commander
DSN	Defense Switch Network
FAA	Federal Aviation Administration
FAAO	Federal Aviation Administration Order
FOD	Foreign Object Damage
FSO	Squadron Flying Safety Officer
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
IPM	Integrated Pest Management
KIAS	Knots Indicated Airspeed
LATNA	Low Altitude Tactical Navigation Area
LG	Logistics Group
MAJCOM	Major Command
MOA	Military Operations Area
MSL	Mean Sea Level
NGB/A7CVP	National Guard Bureau, Environmental Planning Branch
OG	Operations Group
OGV	Standardization and Evaluation
OG/CC	Operations Group Commander
OG/OSF	Operations Group, Operational Support Flight
OPR	Office of Primary Responsibility
ORANG	Oregon Air National Guard
PA	Public Affairs
PDX	Portland International Airport
SAFSO	Squadron Assigned Flight Safety Officer
SE	Safety
SOF	Supervisor of Flying
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

142 FW (ORANG)
Portland, OR
9 February 2017

142 FW BASH Plan 91-212

BIRD/WILDLIFE AIRCRAFT STRIKE HAZARD (BASH) PLAN

1. References: AFI 91-202/MAJCOM Supplements
AFI 91-204/MAJCOM Supplements
AFI 13-201
AFI 13-213
AFI 32-7064
AFMAN 91-223
AFPAM 91-212
FAR Part 139.337
FAA AC 150/5200.33
PDX Wildlife Hazard Assessment
PDX Wildlife Hazard Management Plan

2. Introduction. A bird and wildlife aircraft strike hazard exists at the Oregon Air National Guard (ORANG) installation located at the Portland International Airport (PDX). This is due in part to its geographical location on the confluence of two major river systems and the Pacific Flyway, as well as its daily and seasonal usage by resident and migratory birds and other wildlife species. This plan establishes procedures to minimize these hazards to Oregon Air National Guard aircraft at the installation and in their operating areas. This plan updates existing documents and is based on historical bird/wildlife strike records from the 142 FW and their operating areas, the Wildlife Hazard Assessment and Wildlife Hazard Management Plan developed for PDX, previous NGB/SEF BASH Site Visit information, and the June 2016 Site Visit by NGB/SEF. As part of that visit, a review of wildlife strike records and an updated hazard assessment are included in APPENDIX 1. Wildlife observations and the biological and operational basis for resulting recommendations are included in the attached appendix items. Moderate to high risk hazardous wildlife species observed or documented in the vicinity of PDX are listed in APPENDIX 2. Additional BASH references are attached in APPENDIX 3. No single solution exists to the BASH problem, and a variety of techniques and organizations are involved in the control program. This plan is designed to:

a. Establish a Bird Hazard Working Group (BHWG) and designate responsibilities to its members.

b. Establish procedures to identify high hazard situations and to aid supervisors and aircrews in altering or discontinuing flying operations when required.

c. Establish aircraft and airfield operating procedures to avoid high-hazard situations.

d. Provide for disseminating information to all assigned and transient aircrews on bird hazards and procedures for bird avoidance.

e. Establish guidelines to decrease airfield attractiveness to birds.

f. Provide guidelines for dispersing birds when they are present on the airfield.

g. Provide guidelines for avoiding birds in operating areas away from the airfield.

h. Identify organizations/OPRs with authority to upgrade, initiate, or downgrade Bird Watch Conditions.

i. Provide guidelines to maintain the working relationship with the Port of Portland Wildlife staff.

3. Summary of Recommendations:

a. Continue to conduct BHWG meetings semi-annually (per AFI 91-202) and ensure that all attendees are documented and included in all correspondence and action items. Ensure PDX Wildlife Manager or their designee attends BHWG meetings.

b. Ensure BHWG reviews the PDX Wildlife Hazard Management Program Annual Report each year. A copy of this report should be kept on file in the 142 FW Safety Office.

c. Continue working with and support efforts of the PDX Wildlife Manager to implement wildlife hazard management strategies at PDX. These efforts include:

(1) Continue to support the raptor program by assisting when possible in the translocation location of birds as well as in the active trapping program.

(2) Continue to support the airport staff in working towards a more uniform airfield turf, elimination of bare areas, and management of grass heights between 7-14 inches where possible.

(3) Continue to support and augment, if necessary, the PDX efforts to reduce grasshopper populations on the airfield.

(4) Continue to support the use of anti-perching devices on the airfield when necessary.

(5) Continue to support the airports efforts to repair all breaches observed under the perimeter fence. Report all breaches to PDX.

d. Recommendations for the base leasehold property:

(1) Actively disperse all Canada geese immediately from ANG leasehold property. Explore options to install visual barrier systems / plantings in open areas where Canada geese congregated on leasehold property.

(2) Periodically inspect hangar facilities and other base structures to ensure birds are not roosting or nesting in these structures.

(3) Maintain base leasehold grass areas 7-14 inches per AFI 91-202.

(4) Clear vegetation from all drainage ditches and include periodic clearing in base mowing/grounds maintenance programs. Coordinate all drainage projects with CE

(5) Install anti-perching devices on structured (i.e. poles and signs) when deemed necessary.

e. ANG should support ongoing efforts by PDX to reduce resident goose populations that may pose a threat to aviation at PDX.

f. Streaked Horned Lark. If bird strike remains (SNARGE) or carcasses found on the base leasehold are identified as or have the potential to be the federally-listed streaked horned lark, immediately provide this information to the PDX Wildlife Manager. In addition, when conducting projects or studies that involve the federally-listed streaked horned lark or their potentially suitable habitat, coordinate these activities with the PDX Wildlife Manager to ensure goals and objectives are consistent with PDX efforts.

g. Continue to implement Bird Watch Condition (BWC) codes and Phase I and Phase II operating windows. Coordinate this information with ATC.

h. Continue to report all strikes. Explore innovative ways to encourage reporting and collection of strike remains using briefings, videos, and posters.

i. Share strike reports with the PDX Wildlife Manager in an effort to develop a consolidated picture of local bird strike risk periods.

j. Establish a Unit Page in the Avian Hazard Advisory System (AHAS) managed by the USAF BASH Team.

k. Continue to motivate assigned ANG staff to engage in the BASH program. Consider sending at least one unit representative to participate in the military training session during the annual Bird Strike Committee-USA meeting.

l. Continue to serve as an active member of the PDX Aviation Wildlife Advisory Committee.

4. BASH Plan Execution:

a. Concept of Operations:

(1) Phases. Designate Phase I and Phase II periods of bird activity based on historical information. Phase II represents heavy bird activity, normally associated with migratory seasons. Records indicate winter months and migratory seasons (mid-November - March) as most likely periods of significantly increased local bird activity for waterfowl. This is based on seasonality trends and forecasts. Publish Phase I and II designations in the Flight Information Publication and post in Base Operations/Flight Planning room, as appropriate.

PHASE II: November 15 – March 15

(2) Coordination. Reducing the bird strike hazard at the 142 FW requires a cooperative effort between several 142 FW organizations, tenant units, PDX Wildlife staff and the surrounding community. The OPR for coordinating this plan is 142 FW/SE.

(3) Bird Hazard Working Group (BHWG):

(a) Function. Collects, compiles, and reviews data on bird strikes to inform the airfield manager on current phases at the AOB meetings. Identifies and recommends actions to reduce wildlife hazards. Recommends changes in operational procedures. Prepares informational programs for aircrews. Assists the installation commander by acting as a point of contact for off-installation BASH issues.

(b) Authority. The BHWG submits all recommendations to the installation commander for approval. Implementation is through the normal chain of command.

(c) Composition. The chairperson will be the 142 FW/CV or designee. As a minimum, the group will consist of a representative from flight safety, aircraft maintenance, civil engineering (pest management, natural resources, grounds maintenance, etc.), airfield management, environmental management, ATC, the PDX Wildlife Manager, and representatives from other tasked organizations (ANNEX A) as required. Meeting minutes will be maintained and appropriate distribution made.

(d) Meeting Schedule. As requested by the chairman of the BHWG, but at least semi-annually in accordance with AFI 91-202.

b. **Tasks:** ANNEX C outlines the general and continuing tasks and responsibilities for each organization and gives specific hazard reduction measures for varying bird hazard conditions.

ANNEX A TO 142 FW BASH Plan 91-212

TASKED ORGANIZATIONS:

OREGON AIR NATIONAL GUARD:

142 FW/CC
142 FW/CV
142 FW/SE
142 FW/PA
142 OG/CC
142 OG/OGV
142 OSF/CC
142 OSF/OSA
142 MXG/CC
142 MSG/CC
142 MSG/EM
142 CES/BCE

Portland International Airport:

PDX Wildlife

NOTE: This list is representative only; other interested or required agencies may be tasked as needed.

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ANNEX B to 142 FW BASH Plan 91-212

OPERATIONS:

1. **Vice Wing Commander or Designee (FW/CV):**

a. Chairs BHWG meetings.

b. Approves recommendations of BHWG.

c. Reviews notes from the Bird Hazard Working Group.

d. Provides recommendations to PDX and other tenant units.

2. **Operations Group Commander (OG/CC):**

a. Declares, disseminates, and terminates Bird Watch Conditions at the Oregon ANG installation, training areas, and deployed locations through the SOF (or DC when unit is deployed) (ANNEX D).

b. Issues specific guidance for aircrews, DCs, and SOFs on procedures to be followed under Bird Watch Conditions (ANNEX D).

c. Makes operational changes to avoid areas and times of known hazardous bird concentrations, mission and operations permitting. Considers the following, during periods of increased bird activity:

(1) Coordinate with ATC to raise pattern altitude or change pattern direction, if possible.

(2) Avoid takeoffs/landings at dawn/dusk $\pm$ 1 hour.

(3) Reschedule local training or transition to different airspace.

(4) Raise altitude enroute to training areas.

(5) Limit time in low-altitude environments to minimum for training requirements.

(6) Select routes or training areas based on bird hazard data from HQ AFSC/SEFW, using the Bird Avoidance Model and Avian Hazard Advisory System for low-level route and range analysis (see APPENDIX 1).

(7) Restrict or delay takeoffs and direct full stop landings or diverts as required.

d. Ensures aircrew completes Form 853 if a known bird strike occurs.

3. **Maintenance Group Commander (MXG/CC):**

a. Issues specific guidance to personnel for the reporting of all discovered bird strikes on aircraft to Quality Assurance and Safety (ANNEX E).

b. Issues procedures for the preservation of non-fleshy bird remains if discovered on aircraft. Even the smallest fragment of feather (down) should be forwarded to 142FW/SE for identification (ANNEX E).

c. Ensures all aircraft cavities and openings are inspected on the ramp or after undergoing maintenance in hangars for birds or nesting materials before returning to operation.

4. **Safety (SE):**

a. Monitors installation compliance with AFI 91-202 and reports all bird strikes and hazards per AFIs 91-204, 91-202, and ANNEX E of this plan.

b. Reports on BASH and includes BHWG recommendations and actions in the agenda and minutes of the wing's quarterly safety meetings.

c. Disseminates BASH data to BHWG and flying units.

d. Provides the BHWG with the current BASH guidance from higher headquarters and supplemental information from the US Fish and Wildlife Service or other agencies.

e. Provides any additional information on migratory, local, and seasonal bird activities through contact with the US Fish and Wildlife Service, USDA/WS, and other agencies.

f. Monitors bird activity and strike statistics and advises the chairperson of the working group when a meeting is deemed necessary.

g. Coordinates with aircrews and maintenance personnel in collecting of non-fleshy remains after strikes. Sends any salvaged bird strike remains (feathers, beaks, and feet only) to the Smithsonian Institution (ANNEX E).

h. Establishes a bird hazard awareness program in conjunction with squadron flying safety officers, to include films, posters, and information on local bird hazards and reporting procedures.

i. Provides strike information to the PDX Wildlife Manager to ensure accurate reporting between the base and PDX. This includes notification on the species identification from the Smithsonian Institute's Feather Lab.

j. Notify PDX Wildlife of all bird strikes within 24 hours.

5. **Standardization and Evaluation (OGV):**

a. Reviews with OG/CC all proposed guidance for aircrew and the SOF on procedures to be followed under Bird Watch Conditions.

b. Reviews with OG/CC potential operational changes to avoid areas and times of known hazardous bird conditions.

c. Reviews with OG/CC all proposed new routes and training areas or changes to existing routes/areas for BASH potential.

6. **Supervisor of Flying (SOF):**

a. Declares Bird Watch Conditions based on:

(1) Information relayed by PDX Wildlife

(2) Information relayed by airborne aircraft.

(3) Observations made by base operations personnel.

NOTE: The OG/CC or his designated representative (usually the SOF) will downgrade or cancel Bird Watch Conditions, commensurate with updated information. In the absence of either of these options the Airfield Manager or PDX Wildlife Manager has the authority.

b. Obtains and posts current bird activity data and ensures it is readily available for aircrew briefings. Advises each crew of the Bird Watch Conditions at the airfield and in training areas.

c. Briefs aircrews to report all bird strikes and hazardous conditions promptly.

7. **Base Civil Engineer (CES/BCE) in conjunction with OSF/OSA and Environmental Management (EM): (Note that many of the below functions are the responsibility of the airport staff and thus should be coordinated and implemented as such):**

a. Coordinates with airfield management staff on all civil engineering and habitat management issues as listed.

b. Provides representation to the BHWG to monitor and advise group of civil engineering procedures.

c. Develops procedures for removal or control of bird attractants on base property.

d. Initiates surveys and writes environmental impact assessments and statements as required.

e. Conducts BASH surveys.

f. Corrects environmental conditions to decrease BASH potential.

g. Uses land management practices that reduce BASH potential.

h. Modifies airfield habitat consistent with runway lateral and approach zone management criteria per AFI 32-1026 on base property. Habitat modification to reduce BASH beyond the 1000-foot distance criterion is desired and will further reduce BASH potential.

i. Incorporates the following practices into the installation Land Management Plan for base property IAW AFI 32-7064, if applicable:

(1) Managing Grass Height. Where possible, maintain a uniform grass height between 7 and 14 inches on the airfield (per AFI 91-202).

(2) Controlling Broad-leaved Weeds. Keep broad-leaved weeds to a minimum on the airfield. Apply herbicides as necessary. Broad-leaved weeds attract a variety of birds, may produce seeds or berries, and may limit grass growth.

(3) Planting Bare Areas. Note that bare areas are frequently used by birds as feeding and resting sites, or to obtain grit. Work with airport staff to promote projects to plant grass on the airfield to eliminate bare areas on the airfield.

(4) Removing Dead Vegetation and Debris Piles. As soon as possible, remove dead vegetation such as brush piles, grass clippings, hay bales, derelict equipment, construction debris etc., and the cover it affords.

(5) Removing Dead Birds and Animals. Remove dead birds or other animals from the field to avoid attracting vultures or other birds. Forward non-fleshy remains that may be caused by collision with aircraft to flight safety for identification.

(6) Controlling Pests. Invertebrates and rodents provide important food sources for birds. Civil engineering should be contacted for assistance if pest become a wildlife hazard attractant.

(7) Stormwater Management Facilities – Stormwater management areas (ditches, dry detention, and wet detention) should be designed with steep slopes armed with rip-rap or concrete. Maintain these areas vegetation free to improve water flow and decrease the attractiveness of these areas to wildlife.

(8) Fencing. Periodically inspect current perimeter fencing. Repair breaches under the fence when observed.

(9) Roosting/Perching. Periodically monitor ANG hangars, structures, and buildings for nesting/roosting activities. Pigeons have been found nesting within the hangars. Nests and birds should be removed if their populations increase and/or if they persist in the hangars. Often keeping hangar doors closed is the easiest way to prevent wildlife from using these spaces. Work with Port of Portland Wildlife to remove birds and nests as needed.

(10) Canada geese. Immediately discourage or removal all geese from the base leasehold. Investigate options to install visual barrier for open space where geese congregate on the base leasehold. Coordinate with PDX Wildlife Manager to develop these strategies.

8. **Airfield Manager (OSF/OSA):** Per ANNEX D of this plan, the overall authority to declare Bird Watch Conditions is vested with the SOF during normal flight operations. During daily flight operations the on-duty Airfield Manager will coordinate with the PDX Wildlife Staff to establish the current Bird Watch Condition. This condition will be forwarded to the current SOF and posted on the Squadron's Airfield Status Board. During all other periods, the Airfield Manager, or his/her designated representative will act as overall declaring authority. PDX Wildlife Staff may also be designated to declare Bird Watch Conditions at any time.

a. Notifies the PDX Wildlife Staff or ORANG staff that bird dispersal is needed. When approved to perform dispersal activities on the airfield, this team will be used when birds create a hazardous condition. Coordination with PDX Wildlife staff and Air Traffic Control is required. 142 FW staff conducting dispersal activities will only operate in direct concert with PDX Wildlife.

(1) Pyrotechnics. Pyrotechnics include 15mm or 12-gauge scare cartridges that produce a secondary explosion, or screamers that produce a loud whistle to scare birds from the area. The scare cartridges are launched from either a shotgun or a pyrotechnic pistol. Pyrotechnics are effective for dispersing most bird species.

(2) Depredation. Lethal control can be used as allowed under state and federal permit/regulations. The PDX Wildlife Manager will implement lethal control methods. Lethal control should be used as a last resort to remove wildlife that does not respond to non-lethal methods. Rock Pigeons (domestic pigeons), European Starlings, and House Sparrows can be lethally controlled without a permit. Most other species require federal and state permits.

(3) Other Devices. Ingenuity is encouraged in the bird scare program. Other devices may be used. Radio-controlled model aircraft, falconry, or dogs may be

considered based on availability and problem bird species. Contact the BASH team at HQ AFSC/SEFW, Kirtland AFB, NM for advice in this area.

(4) Ineffective Methods. Ultrasound, rubber snakes, fake or stuffed owls, rotating/flashing lights, loud music, and other such devices have not proven effective and should not be used.

b. Notifies 142 FW Command Post, Security Forces and ATC when significant bird scare activities will be necessary on the airfield.

c. Conducts airfield survey. Dead birds, possibly involved in strikes to ANG aircraft, should be removed and forwarded to wing safety for identification and shared with airport operations, PDX Wildlife Staff, or other users. Bird sighting surveys should be filled out and sent to wing safety as appropriate.

9. **Air Traffic Control (ATC):**

a. When observed, reports bird or other wildlife activity on or near the airfield that could pose a wildlife hazard strike risk to the aircrew and, if possible, the SOF or Airfield Management.

b. Issues bird activity advisories to aircrews as required by FAA Air Traffic Organization Policy, Order JO 7110.65W (2015). Uses very specific language to communicate locations, times, and behaviors of birds identified as possible hazards to aircraft (JO 7110.65W, paragraph 2-1-22).

c. Issues traffic advisories such that pilots can make operational changes such as missed approaches or delayed takeoffs when possible bird hazards appear on ATC radar.

d. Updates bird hazard advisories on Automatic Terminal Information Service (ATIS) as required and if available.

e. Communicates with the PDX Wildlife Staff when active dispersal is required or on-going within the airport operating area.

10. **Public Affairs (142 FW/PA):** 142 FW public affairs will participate as required and upon request will provide a public information program designed to inform base personnel, dependents, and the general public on the hazards and costs of uncontrolled bird activity and the measures being taken to minimize them.

a. Provides photographic services to document bird strikes and related activities as required.

b. Provides graphic support to publicize bird hazards and actions taken to minimize them as required.

11. **Training Areas/Ranges:** Use the Bird Hazard Warning System to report significant bird activity noted away from the base. Report sightings to the SOF or Safety Office and advise aircrews on hazardous conditions. Consult the Bird Avoidance Model and Avian Hazard Advisory System and together with Pilot Reports or visual observations, provide current Bird Watch Conditions to aircrews entering range or low-level airspace. Bird Watch Conditions SEVERE or MODERATE must be relayed to all aircrews; Bird Watch Condition LOW may be relayed at the discretion of the SOF or at the request of the aircrew.

12. **PDX Wildlife Manager**:

a. Supervise the PDX Wildlife Program staff in the implementation of the PDX WHMP.

b. Develop and implement annual work plans and budgets for the Wildlife Program.

c. Prepares an annual report, including documentation of WHMP review and training records to FAA and ORANG prior to the annual Part 139 inspection.

d. Prepares and submits/validate all civilian strike reports at PDX with the FAA.

e. Serve as the technical area expert for PDX, ORANG and all Port owned General Aviation facilities on wildlife hazard management issues and regulatory requirements.

f. Oversees raptor trapping and translocation program. Integrate these activities with other wildlife management activities ongoing at PDX.

g. 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.

h. 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.

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

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

k. Keep the AOB briefed on program progress, management activities, and controversial issues, and relay management guidance to members of the wildlife program.

l. Attends 142 FW BHWG meetings.

ANNEX C to 142 FW BASH Plan 91-212

MAPS and CHARTS

1**. General.** This annex outlines the use and requirements of the maps and charts required to implement the BASH program. Wing Safety should maintain and update maps and charts as necessary.

2. **Oregon ANG Installation at Portland International Airport and Surrounding Area Map:**

a. Periodic habitat surveys should be conducted to identify major habitat types available to birds. Update maps based on these surveys as local land uses and habitat conditions change.

b. When a specific hazard is identified and the location of the activity isolated, use the habitat map to determine if a specific attractant exists that can be altered within the scope of this plan.

c. Use the habitat map as a guide for the long range civil engineering program to reduce actual and potential hazardous environmental factors at and near the Portland International Airport.

d. The local flying unit should procure maps and navigational charts of the surrounding area to designate features for BASH potential and attach them as part of this annex.

e. A local area map and aerial photo are included in Figure 1.

3. Training Area/Range Maps:

a. The Avian Hazard Advisory System (AHAS) provides graphic output (maps and charts) that indicate bird strike risk on low-level routes, ranges, MOA's, LATNS, and other special use airspace. This is a web-based system (www.usahas.com) that primarily uses processed data from the nationwide system of weather radars (WSR 88-D or "NEXRAD) located throughout the lower 48 states. AHAS also predicts bird strike risk in many areas based upon weather forecast data. Lastly, AHAS includes a low-resolution distribution map of potentially hazardous bird species known as the Bird Avoidance Model or "BAM". The BAM is an interpolated risk surface derived from over three decades of Christmas Bird Counts (CBC data) and Breeding Bird Surveys (BBS data), along with other data sets from various state and federal agencies. The BAM is the default risk layer for queries that are not from the current time interval or within a 24- hour window. BAM can be used to plan missions in the future; however, the data are in two-week intervals and often show very little change for several months. AHAS should be queried as late as possible prior to take-off and may be viewed through wireless systems with an internet browser.

b. The 142 FW currently does not have an AHAS Unit Page. It is recommended that a Unit Page be developed. Figure 2 provides a sample output from AHAS with the "AHAS 12 HR RISK" for PDX. Figure 3 provides a sample output for PDX with "GOOGLE MAP."

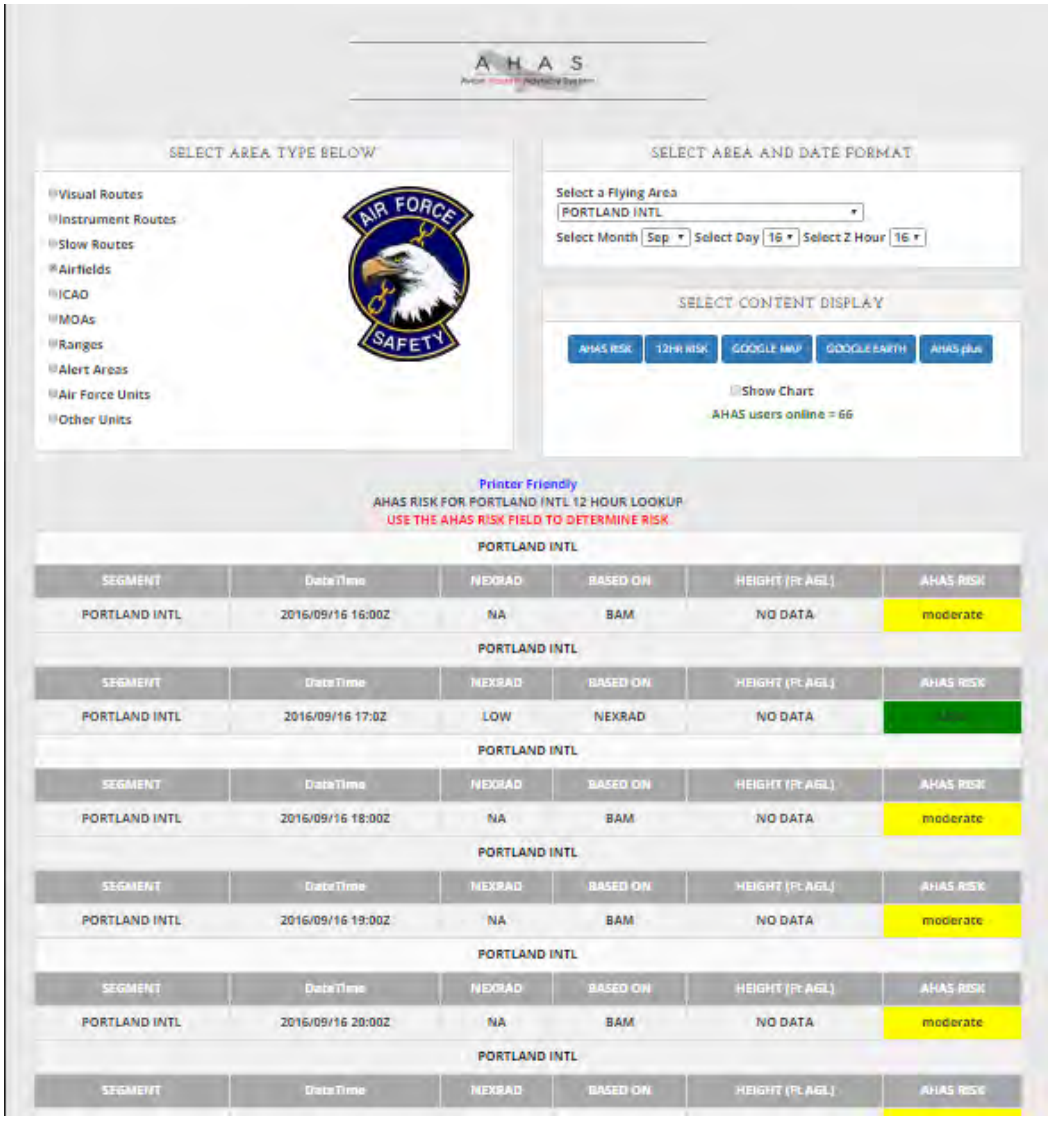
c. Once a Unit Page is established, other developed routes and training areas may be added to the AHAS by contacting the USAF BASH Team or their contract support office, DeTect Inc., 1902 Wilson Ave, Panama City, FL 32444.

d. AHAS output can be printed or displayed in real time on a computer display screen in the flight planning room or base operations.

e. Analyze and disseminate these data to the flying unit according to procedures outlined in ANNEX D.

FIGURE 1. **PORTLAND INTERNATIONAL AIRPORT LOCAL AREA MAP/AERIAL PHOTO.**

FIGURE 2. **AHAS – PDX RISK OUTPUT EXAMPLE**



AHAS

SELECT AREA TYPE BELOW

- Visual Routes
- Instrument Routes
- Slow Routes
- Airfields
- ICAO
- MOAs
- Ranges
- Alert Areas
- Air Force Units
- Other Units

SELECT AREA AND DATE FORMAT

Select a Flying Area: PORTLAND INTL

Select Month: Sep | Select Day: 16 | Select Z Hour: 16

SELECT CONTENT DISPLAY

AHAS RISK | 12HR RISK | GOOGLE MAP | GOOGLE EARTH | AHAS plus

Show Chart

AHAS users online = 66

Printer Friendly

AHAS RISK FOR PORTLAND INTL 12 HOUR LOOKUP

USE THE AHAS RISK FIELD TO DETERMINE RISK

PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK
PORTLAND INTL	2016/09/16 16:00Z	NA	BAM	NO DATA	moderate

PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK
PORTLAND INTL	2016/09/16 17:00Z	LOW	NEXRAD	NO DATA	low

PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK
PORTLAND INTL	2016/09/16 18:00Z	NA	BAM	NO DATA	moderate

PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK
PORTLAND INTL	2016/09/16 19:00Z	NA	BAM	NO DATA	moderate

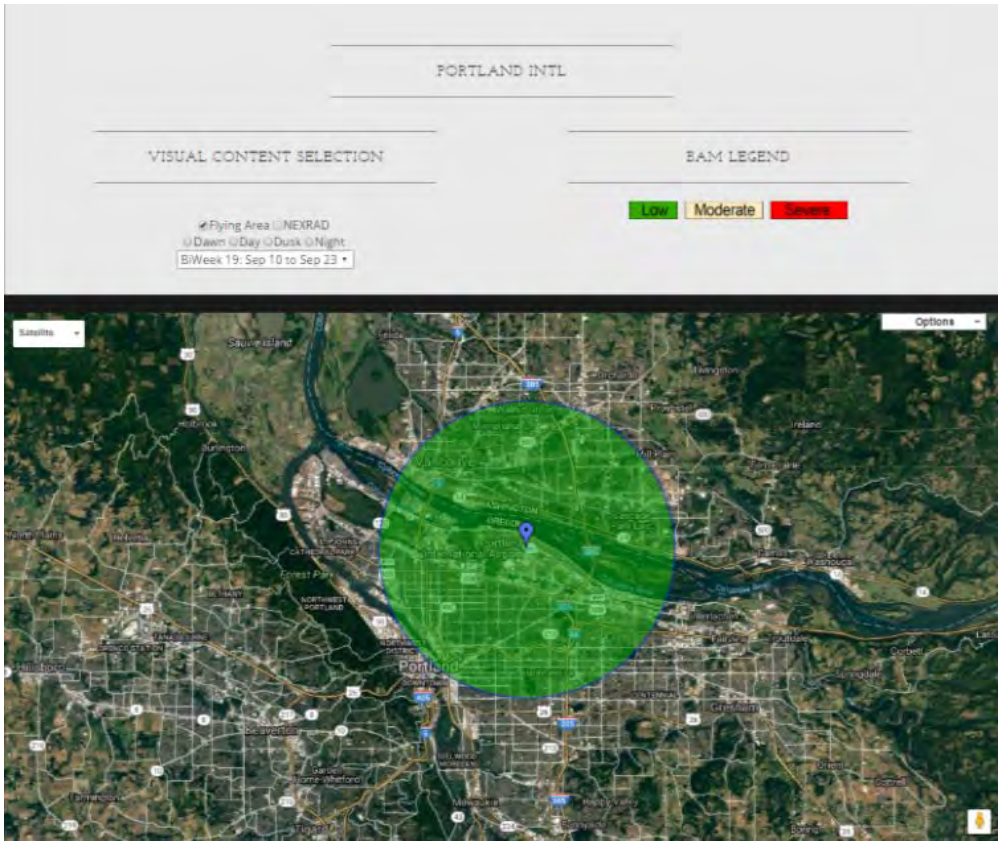
PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK
PORTLAND INTL	2016/09/16 20:00Z	NA	BAM	NO DATA	moderate

PORTLAND INTL

SEGMENT	DateTime	NEXRAD	BASED ON	HEIGHT (Ft AGL)	AHAS RISK

FIGURE 3. **SAMPLE AHAS GOOGLE EARTH FEATURE – PDX**



142 FW (ORANG)
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ANNEX D to 142 FW BASH Plan 91-212

BIRD HAZARD WARNING SYSTEM: OPERATION BIRD WATCH

1**. General.** This operation establishes procedures for the immediate exchange of information between ground agencies and aircrews concerning the existence and location of birds that could pose a hazard to flight safety.

2**. Bird Watch Conditions.** Use the following terminology for rapid communications to disseminate bird activity information and implement unit operational procedures. Give bird locations with the condition code.

a. **Bird Watch Condition SEVERE.** Wildlife activity of birds on or immediately above the active runway or other specific locations that represent an immediate hazard to safe flying operations. Aircrews must thoroughly evaluate mission need before operating in areas under condition SEVERE.

b. **Bird Watch Condition MODERATE.** Wildlife activity of birds observable in locations that represent a probable hazard to safe flying operations. This condition requires increased vigilance by all agencies and extreme caution by aircrews.

c. **Bird Watch Condition LOW.** Normal bird activity on and above the airfield with a low probability of hazard. Continue with operations as normal.

3. **Authority.** The SOF is the authority to declare a Bird Watch Condition during normal flight operations. During daily flight operations the on-duty Airfield Management Staff will coordinate with the PDX Wildlife Staff to establish the current Bird Watch Condition. This condition will be forwarded to the current SOF and posted on the Squadron's Airfield Status Board. During all other periods, the Airfield Manager, or his/her designated representative will act as overall declaring authority. PDX Wildlife Staff may also be designated to declare Bird Watch Conditions at any time. This person can declare conditions based on ground observations, pilot reports, radar observations, etc.

4**. Communications.** Disseminate Bird Watch Conditions by the following means:

a. During periods of flight operations, include bird hazard information other than low activity (i.e. normal conditions) in the hourly ATIS information, if available, as specified in FAA Handbook 7110.65. Ensure common language is used to direct specific attention to bird concentrations that may be hazardous to flight operations. Military aircrews may need to translate these advisories into Bird Watch Condition terminology as described. When the SOF declares Bird Watch Condition MODERATE or SEVERE, notify the Airfield Manager and airborne aircrews. The Airfield Manager will post the Bird Watch Condition and change the airfield status board.

b. During periods of non-flying operations, the Airfield Manager or his/her designee will declare the Bird Watch Condition. Upon declaration of a Bird Watch Condition other than LOW, they will ensure bird watch information is posted in on the airfield status board.

c. Note that the primary means of transmitting Bird Watch Conditions will be via the airfield status board. However, under Bird Watch Condition SEVERE, the SOF and air traffic control agency will ensure that the pilot understands the condition and is provided the option to delay, divert, or continue the proposed operation into the hazardous area.

5. **Aircrew Responsibilities and Procedures:**

a. If an aircrew observes or encounters any bird activity while in flight that could constitute a hazard, the aircrew should contact the SOF or ATC. The following information is necessary:

(1) Call sign.

(2) Location.

(3) Altitude.

(4) Time of sighting.

(5) Type of bird (if known).

(6) Approximate number of birds.

(7) Behavior of birds (soaring, flying to or from a location, etc.).

b. Additional direction to all pilots is provided based upon the coded Bird Watch Conditions and the location under condition SEVERE:

(1) Traffic Pattern. Only full-stop landings are permitted. The SOF may consider changing runways, delaying takeoffs and landings, diverting aircraft, changing pattern altitude, etc.

(2) Training Areas. Identify a specific area and altitude. All flights must avoid using the area where the condition was identified.

(3) Low-Level Routes. Note and avoid specific routes or segments and altitudes.

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ANNEX E to 142 FW BASH Plan 91-212

REPORTS AND FORMS:

1. **General.** This annex outlines the procedures and forms required to report bird strikes per AFI 91-204 to enhance the BASH program at the 142 FW.

2. **Reporting Bird/Wildlife Strikes (AFI 91-204 and AFMAN 91-223):**

a. All damaging and non-damaging bird/wildlife strikes shall be reported to the BASH Team through the Air Force Safety Automated System (AFSAS). Additional information may be obtained on the Air Force Safety Center web page (http://af.safety.af.mil/SEF/BASH/SEFW_home.shtml). When bird/wildlife strikes occur to captive or live munitions (explosive/missiles), these are reported as if the bird/wildlife hit the aircraft. Reporting all bird/wildlife strikes is a necessary part of an effective BASH plan. An in- depth knowledge of the circumstances leading to a bird/wildlife strike is vital before realistic recommendations can be made.

b. Flight safety offices of the organization credited with the aircraft's flying hours will report all bird/wildlife strikes.

c. Report bird/wildlife strikes using the AFSAS in accordance with AFMAN 91-223. AFSAS requires a user profile (username and password). MAJCOM safety offices have designated AFSAS administrators to create BASH AFSAS accounts for each unit. Aircrews and maintenance personnel documenting the necessary data for reporting wildlife strikes through AFSAS can use AF Form 853.

d. For every bird strike, send remains (if available) to the Smithsonian National Museum of Natural History for identification. Remains may include feet, beak, and/or feathers. If no remains are apparent, wipe blood smear with alcohol wipe (e.g. Purell) or spray blood smear with alcohol and wipe with a towel. Allow to dry and then fold wipe or towel and place into labeled Ziploc bag. Send a copy of the corresponding AFSAS report with the strike evidence to the following address listed below. For high priority mishap identifications ship remains via overnight delivery to the following address:

U.S. Postal Service (routine / non-damaging cases) ~~~ Feather Identification Lab Smithsonian Institution E600, MRC 116 P.O. Box 37012 Washington, DC 20013-7012	**Overnight Shipping** (priority / damaging cases) ~~~ Feather Identification Lab Smithsonian Institution E600, MRC 116 10th & Constitution Ave., NW Washington, DC 20560-0116

~~FEDERAL AVIATION~~ ADMINISTRATION

JUN 28 2019

CLJ
INSPECTOR

If you collect a whole bird carcass, pluck (do not cut) several types of feathers and send these materials to the Smithsonian. Remains found on the runway as the result of a suspected aircraft strike should also be recorded into AFSAS and sent to the Smithsonian for identification. Once the Smithsonian has entered the identification into the AFSAS report, AFSAS will automatically notify the reporting unit of the species identification through email. Bird remains recovered from a mishap site should be collected IAW instructions outlined in the paragraph above. The ISB should not delay recovering and shipping remains to the Smithsonian Institution, as the sample could be compromised. If there are any questions, contact HQ AFSC/SEFW (DSN) 246-5679. The USAF Safety Center BASH website provides additional information regarding avian influenza guidelines (http://www.afsec.af.mil/aviationsafetydivision/bash).

e. For wildlife strikes other than birds, send samples of skin, fur, teeth or other non-fleshy remains, if possible, or a photograph of the remains along with the corresponding BASH AFSAS report to the Smithsonian for identification. Similarly, you can also wipe blood smear with alcohol and place in plastic bag as instructed for bird strikes above.

3. **Technical Assistance (AFI 91-202):** *The U.S. Air Force Mishap Prevention Program*, outlines responsibilities for reducing bird/wildlife strike hazards. Obtain additional information on BASH management from AFPAM 91-212, *Bird/Wildlife Strike Hazard (BASH) Management Techniques*. Technical assistance is available through the USAF BASH Team, HQ AFSC/SEFW, 9700 AVE G SE, Building 24499, Kirtland AFB, NM 87117-5671. See the USAF Safety Center website for current contact information: http://www.afsec.af.mil/aviationsafetydivision/bash.

4. **Bird Sighting Report:**

a. The Safety Office will coordinate with the PDX Wildlife Manager for information related to observed bird activity on or near the airport. If the presence of wildlife on or near the airfield presents a hazard to aviation, the PDX Wildlife Manager will relay this information to the Safety Office, Airfield Management, and ATC.

b. Wildlife observation data and wildlife hazard management activities shall be documented by the PDX Wildlife Staff and coordinated with the Safety Office upon request.

c. A summary of wildlife observations and wildlife hazard management activities will be developed by the Wing SE and distributed for review at BHWG meetings and for use by flying squadrons, CE, base operations, or other applicable offices and can be used to target areas of concern.

142 FW (ORANG)
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ANNEX F to 142 FW BASH Plan 91-212

DISTRIBUTION:

ANG/SE
HQ AFSC/SEFW, BASH Team, Kirtland AFB NM 87117
142 FW/CC
142 FW/CV
142 FW/SE
142 FW/ PA
142 FW/CP
142 OG/CC
142 OG/OGV
142 OSF/CC
142 OSF/OSA
142 MXG/CC
142 MSG/CC
142 MSG/EM
142 CES/BCE
PDX Wildlife Manager

142 FW (ORANG)
Portland, OR
9 February 2017

APPENDIX 1. 2016 BASH SITE VISIT ASSESSMENT AND RECOMMENDATIONS

Introduction:

The Air National Guard Bureau (ANGB) Directorate of Flight Safety's contract Bird Strike Hazard (BASH) consulting team (ERS Inc.) visited the 142nd Fighter Wing (142 FW) at Portland International Airport (PDX) from 25 July to 27 July 2016. PDX is a public use, commercial service airport located in Portland, Multnomah County, Oregon.

The purpose of the visit was to review the unit's BASH plan, conduct on-site evaluations of airport habitat, provide staff training, and provide recommendations to decrease the potential risk to aircraft through coordinated management strategies with the commercial airport operator. During the visit the ERS Team met with 142 FW support staff as well as with representatives from PDX airport wildlife management staff. Prior to departing, the ERS BASH Team reviewed the draft recommendations that are provided in this Appendix and incorporated them into the updated BASH Plan.

The previous ANGB contractors conducted a BASH Site Visit in 2008. Since that time, the 142 FW Safety Office has reviewed the plan on an annual basis. The unit BASH Plan is well written and it was evident that all offices with responsibilities are trained and motivated to execute the plan. Additionally, the unit has a strong working relationship with the PDX Wildlife Management Team. The revisions in this plan primarily focus on updating recommendations, reducing the repetitive text, and streamlining the plan into a more compact, useable format. Since the 142 FW is a tenant unit on the airport, most of the habitat management, pavement and fencing infrastructure, and active bird and wildlife control measures are implemented by the PDX Wildlife Management Team. Occasionally, 142 FW staff will augment the active control measures.

1. Regional Setting and Local Bird/Wildlife Hazards

Local Setting and Local Bird/Wildlife. PDX is the primary air transportation hub of Oregon. The Airport is located within the City of Portland, approximately ten miles northeast of downtown and is adjacent to the Columbia River. The Airport comprises approximately 3,229 acres of land of which the airfield comprises about 1,725 acres. PDX has three runways; (1) the 11,000-foot South (10R/28L) Runway; (2) the 8,000-foot North (10L/28R) Runway; and (3) the 7,001-foot Crosswind (3/21) Runway. PDX is owned and operated by the Port of Portland (Port), which is led by a nine member governing body called the Port of Portland Commission (Port Commission).

The Columbia River, located north of the runways, and its associated islands and shoreline provide an outstanding attraction for a wide range of potentially hazardous bird species (ANNEX C provide an aerial view of the airport and surround vicinity). Great blue herons, bald eagles, and ospreys are among those species, which are frequently observed feeding and roosting along the river. The Columbia Slough along

Cornfoot Avenue runs the length of the Airport and ANG facility to the south and supports stands of dense trees, brush, and wetland vegetation that attract a variety of birds and other wildlife in the immediate vicinity of the airport (**Figure A1-1**). Additionally, several golf courses located near the airport will occasionally attract a wide variety of birds including Canada geese, other waterfowl, gulls, raptors, blackbirds, and starlings, among other species that can create hazardous conditions at the airport. Forested areas near the airport support nesting and roosting raptors, blackbirds, and starlings that transit and feed on airport property. Light industrial areas also attract birds such as rock pigeons and European starlings that may access the airport to feed and loaf.

Figure A1-1. PDX Local Environment

Much of the airfield is covered with a dense stand of grasses that provide little direct attraction to most bird species. However, some bare patchy areas still provide grit and habitat for some bird species (i.e. larks and doves) and drainage areas occasionally fill with vegetation that reduces water flow and provides habitat for waterfowl and blackbirds. A significant rodent population on the airfield as well as periodic eruptions of grasshoppers may result in periodic attraction to birds of prey such as red-tailed hawks and American kestrels especially during late summer and early fall migration.

Regional Setting. PDX is located 60 miles east of the Pacific Ocean in the Willamette Valley region of the Pacific Northwest near the confluence of the Willamette and Columbia Rivers. The city covers 145 square miles (380 square kilometers) and had an estimated population of 632,309 in 2015, making it the 26th most populous city in the United States. Approximately 2,389,228 people live in the Portland metropolitan statistical area (MSA), the 23rd most populous MSA in the United States. Though much of downtown Portland is relatively flat, the foothills of the Tualatin Mountains,

more commonly referred to locally as the "West Hills", pierce through the northwest and southwest reaches of the city. Council Crest Park, the tallest point within city limits, is located in the West Hills and rises to an elevation of 1,073 feet. The highest point east of the river is Mt. Tabor, an extinct volcanic cinder cone, which rises to 636 feet. Nearby Powell Butte and Rocky Butte rise to 614 feet and 612 feet, respectively. To the west of the Tualatin Mountains lies the Oregon Coast Range, and to the east lies the actively volcanic Cascade Range. The geographical location of the airport is significant in that it located near significant river features (Columbia River and Willamette River) and the Pacific Coast placing it in the Pacific Flyway (**Figure A1-2**) for waterfowl and raptor migration. The temperate climate and annual rainfall also provide excellent conditions on the airfield for the attraction of a wide range of potentially hazardous bird and wildlife species.

Figure A1-2 Migratory Flyways in Central and North America
(source: birding about.com)

1. Wildlife Strike Summary

Wildlife strike data can be a valuable source of information to determine species struck, type of damage, time of day, seasonal occurrences, and location (altitude, phase of flight, miles from the airport etc.). The BASH Team reviewed the 142 FW Air Force Safety Automated System (AFSAS) wildlife strike records for the unit over the past 10 years (2007-2015). During this period a total of 25 strikes were recorded. The most strikes in a year, 6, were recorded in 2011 (**Figure A1-3**). Over the ten-year period, May and August had the highest number of strikes by month (**Figure A1-4**). All 25 strikes were classified as Class E mishaps (no damage to less than $50,000 in damage). The cliff swallow and the Vaux's swift each with 3 reports, were the most frequently identified struck species. Other species reported in AFSAS included, horned lark, mourning dove, European starling, red-tailed hawk, and various other passerines.

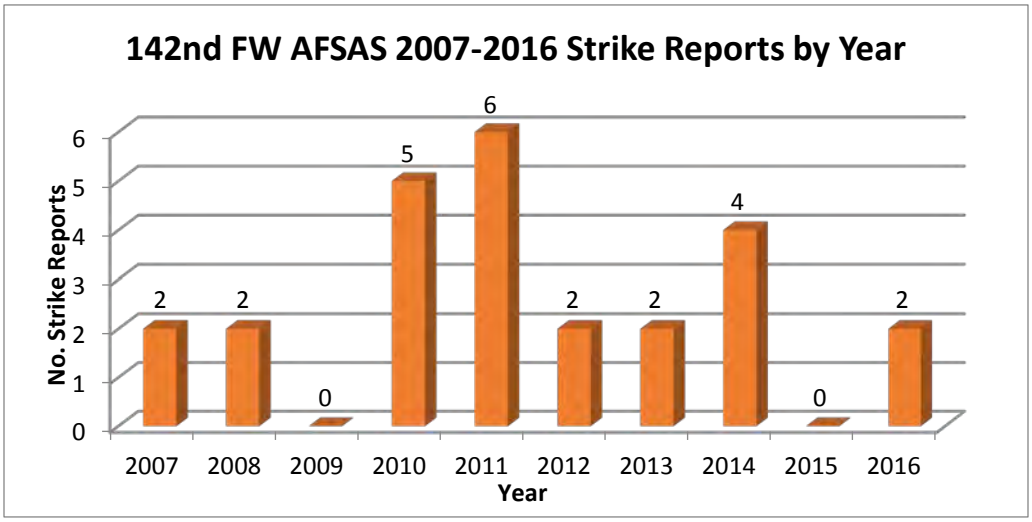

Figure A1-3. 142 FW Strikes reported to AFAS 2007-2015

Figure A1-4. 142 FW Strikes reported to AFAS by Month 2007-2015

The ERS BASH Team also reviewed the wildlife strike records for PDX in the FAA Wildlife Strike Database for the same time period 2007 - 2015. This includes civilian and with some overlapping military strike information. Strike data from the commercial airport is typically a better indicator of trends as there are commonly many more aircraft movements each year and commercial airport operations are generally constant throughout the year. Over the past 10 years, 850 strikes were reported with 2007 and 2008 having the highest number of strike reports (114 and 113 each respectively, see **Figure A1-5** below). July, August, and September showed peaks in strike activity when data by month was reviewed (see **Figure A1-6** below). The peak in the late summer and early fall most likely reflect the emergence of young birds following the summer breeding period and the initial migration of birds in the fall migration. The most frequently struck species identified at PDX was the American kestrel. This bird is common on the airport in late July and August corresponding to the emergence of grasshoppers. Swallows are the next most commonly struck species followed by owls and red-tailed hawks. Other species of concern include Canada geese, gulls, ospreys, and assorted ducks.

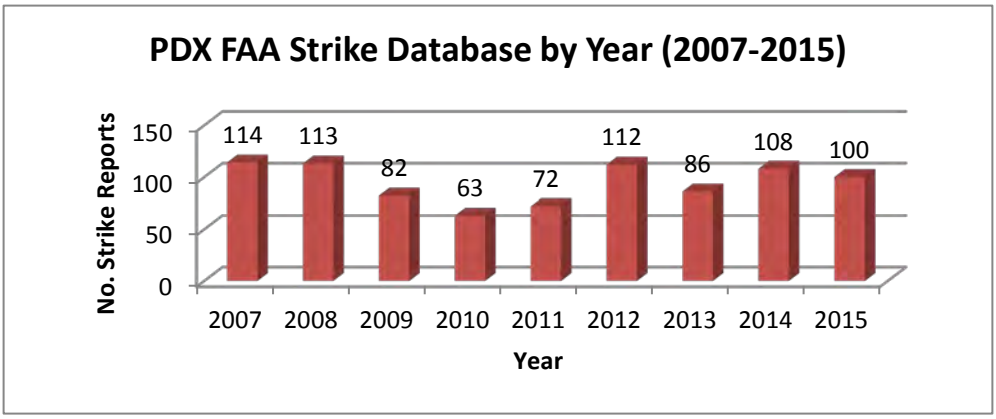

Figure A1-5. PDX Bird/Wildlife Strikes report to FAA 2007-2015

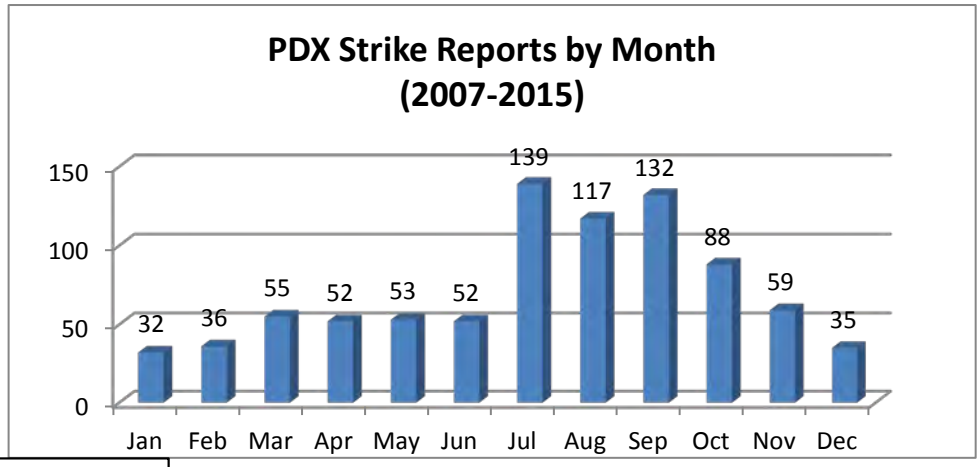

Figure A1-6. PDX Bird/Wildlife Strike by Month reported to FAA 2007-2015

2. Recommendations

The 142 FW BASH Plan is well written, and properly implemented by a trained and highly motivated staff. The PDX Wildlife Management Team manages one of the most progressive programs in the United States. While a significant bird and wildlife hazard potential exists at PDX, these two highly effective programs work in concert to reduce the risk to both civil and military aircraft operating at the airport. The recommendations below are included to provide emphasis to some program elements and to add minor adjustments to others.

a. **Bird Hazard Working Group** The Bird Hazard Working Group (BHWG) is currently meeting at least twice each year.

(1) **Recommendation.** Continue to conduct BHWG meetings at least twice each year. Encourage the continue participation of the airport operations staff as well representatives from PDX and ATC. Use this opportunity to provide share information on military and non-military strike reports. Ensure that the PDX Wildlife Hazard Management Program Annual Report is reviewed and kept on file with the 142 FW Safety Office.

(2) **Recommendation**. Ensure that all attendees are documented and included in all correspondence and action items.

(3) **Recommendation**. Ensure ANG and PDX coordinate information within the PDX WHMP and 142 FW/CEV regarding restrictions associated with Streaked Horned Lark species habitat on the airfield (**Figure A1-7**). ANG staff should request to review any revisions to the PDX WHMP and keep the most recent copy on file in the Safety Office.

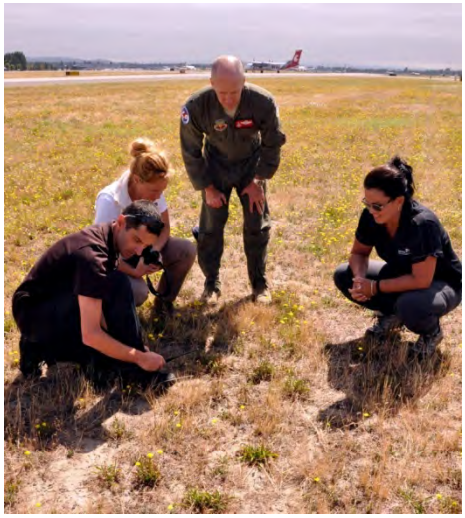

Figure A1-7. PDX Airfield

b**. Unit Responsibilities** BASH duties are properly assigned within the unit. All staff are trained and motivated to execute all aspects of the BASH Plan. More importantly, the ANG staff is familiar with and have strong working relationships with their civilian counter-parts on the non-military airport management staff.

(1) **Recommendation.** Continue to motivate assigned ANG staff to engage in the BASH program with an emphasis on SNARGE collection and strike reporting. Consider sending at least one unit representative to participate in the military training session during the annual Bird Strike Committee-USA meeting.

(2) **Recommendation.** Continue to provide feedback on bird strikes reported by the ANG to the PDX Wildlife Management Team and ATC.

(3) **Recommendation.** Continue to support the PDX Wildlife Management Team initiatives to reduce strike hazards by periodically participating in harassment activities as well as the trap and relocate programs.

(4) **Recommendation.** ANG staff that conduct wildlife deterrence and removal activities on the airfield should coordinate these efforts with the PDX Wildlife Management Team as well as ATC prior to taking any actions. Ensure ANG staff assigned to support PDX has proper training in wildlife deterrence and removal techniques.

c. **Airfield Concerns.** The PDX airfield environment includes large areas of open grasslands and paved runway/taxiway surfaces (**Figure A1-8**). The airfield turf is a mixture of fescue type grasses with broadleaf, weed species and sporadic bare patches. The airfield environment also supports a significant vole population that attracts birds of prey such as hawks and owls as well as great blue herons. The airfield also is subject to periodic eruptions of grasshoppers, which attract American kestrels and other insectivorous bird species. Drainage structures on the airport are well maintained and many have been modified to reduce access by birds and other wildlife.

Figure A1-8. PDX Airfield Habitat

(1) **Recommendation.** Continue to support the airport staff in working towards a more uniform airfield turf, elimination of bare areas, and management of grass heights between 7-14 inches where possible.

(2) **Recommendation.** Continue to support and augment if necessary the PDX efforts to reduce grasshopper populations on the airfield.

(3) **Recommendation.** Continue to support the use of anti-perching devices on the airfield when necessary.

(4) **Recommendations.** Continue to support the airports efforts to repair all breaches observed under the perimeter fence. ANG staff should contact the airport if breaches are observed.

d**. Leasehold Property.** OR ANG has full management authority over the land within the leasehold agreement area. In these areas efforts should continue to reduce or manage habitat that attracts potentially hazardous bird and wildlife species as well as structures such as hangars that may provide roosting and nesting opportunities.

(1) **Recommendation.** Periodically inspect hangar facilities and other base structures to ensure pigeons, starlings, swallows, and other species are not roosting or nesting on rafters or along walls and window ledges. Contact the PDX Wildlife Coordinator or USDA/WS for assistance in removing, excluding, or deterring these species. Permits may be required for these activities.

(2) **Recommendation**. Maintain base leasehold grass areas 7-14 inches per AFI 91-202. Eliminate bare areas near the airfield by re-seeding, sodding

(3) **Recommendation**. If bird strike remains (SNARGE) or carcasses found on the base leasehold are identified as or have the potential to be the federally-listed streaked horned lark, immediately provide this information to the PDX Wildlife Coordinator. In addition, when conducting projects or studies that involve the federally-listed streaked horned lark or their potentially suitable habitat, coordinate these activities with the PDX Wildlife Coordinator.

(4) **Recommendation**. Clear vegetation from all drainage ditches and include periodic clearing in base mowing/grounds maintenance programs. Coordinate all drainage projects with CE (**Figure A1-9**).

Figure A1-9. Drainage Ditch on ORANG Leasehold

(5) **Recommendation**. Currently, the base leasehold has a perimeter fence that includes a subterranean chain link skirt (buried at a 45 degree angle) to deter wildlife from burrowing under the fence. Periodically monitor the fence line to ensure no breaches occur. Repair any observed breaches.

e. **Resident and Migratory Canada Goose Population Reduction.** Resident and migratory Canada geese are present on and near PDX. Canada geese and other waterfowl can pose a threat to aviation. Canada geese should not be tolerated in the AOA and should be discourage or removed from areas on or near the airport including the ANG leasehold property.

(1) **Recommendation.** Support PDX Wildlife Management Team efforts to reduce Canada goose populations on and off of the AOA.

(2) **Recommendation.** Actively disperse all Canada geese immediately from ANG leasehold property. Clear all dispersals with ATC and PDX Wildlife Management Team.

(3) **Recommendation.** Explore options to install visual barrier systems / plantings in open areas where Canada geese congregated on leasehold property. Consult with PDX Wildlife Management Team for options currently in use at PDX (**Figure A1-10**).

Figure A1-10. Planted Goose Barriers at PDX

f. **Raptor Trapping and Relocation**. PDX has one of the premier raptor relocation programs in the United States (**Figure A1-11**). These efforts have been underway for over a decade and have evolved into a highly efficient and effective means to reduce red-tail hawk activity at the airport as well as to address the episodic increases observed in the American kestrels.

(1) **Recommendation.** Continue to support the PDX raptor removal program by assisting when possible in the relocation of birds as well as in the active trapping program.

(2) **Recommendation.** Continue to provide emphasis and support to this extremely important program when funding issues become apparent.

Figure A1-11. PDX Raptor Trapping and Relocation

g. **Bird Avoidance in the Airport Environment.** Bird Watch Condition Codes are properly established per ANNEX D. These advisories are somewhat subjective in nature, lacking any empirical methodology for determining the absolute difference between a Moderate and Severe rating. Further, Bird Watch Condition Codes are not standard phrases used by FAA or FAA contract ATC staff.

(1) **Recommendation.** Discuss the procedures for establishing Bird Watch Condition codes with ATC representatives during the scheduled BHWG meetings.

(2) **Recommendation.** As necessary, develop a memorandum of understanding between OR ANG and ATC to memorialize the criteria for different bird watch condition codes and provide for training if necessary. Ensure that elevated bird watch condition codes are included in ATIS advisories.

(3) **Recommendation.** During the annual review of the BASH Plan, review military bird strike data (AFAS) and civilian bird strike data (FAA) to determine which months have increased bird strike potential. This will assist in identifying and, if necessary, updating Phase I and Phase II operating windows. Coordinate these conditions with the operations staff at the airport to include these periods in NOTAMs.

(4) **Recommendation.** When ATC provides bird hazard advisories that are not in the standard condition code format, train aircrew to request additional bird/wildlife information and coordinate with the SOF to ensure proper operational consideration is provided to all aircrew and base operations staff.

h. **Training Airspace Bird Avoidance** Bird strike reduction while flying low-level routes, MOAs and LATN areas can be realized by using the USAF Avian Hazard Advisory System (AHAS). The 142 FW does not have an established in AHAS page. The 142 FW typically does not conduct low-level training, however a list of training areas, MOAs and LATN used frequently the wing could be listed on Unit specific AHAS page. This information could be used as a general wildlife advisory when operating in or through these areas. AHAS updates approximately every 6 minutes and subsequently should be queried as close to the time operations in that airspace are being considered. For operations planned within the next 24 hours, the AHAS will provide forecast advisories based upon weather forecast data as well as the historical distribution of bird populations from the Bird Avoidance Model (BAM). AHAS also contains a tutorial that provides detailed information on how the system is best used as well as some common misconceptions on the intended use.

(1) **Recommendation**. Establish a 142 FW Unit Page on AHAS. Contact the USAF BASH Team (Kirkland AFB) and Mr. Ron White at DeTect Inc. (850) 763-7200 or through the AHAS website: www.usahas.com. Provide a list of MOAs, LATN, or routes the unit would like to include on their page. Incorporate a review of this information prior to launch events (See ANNEX D). Until a Unit Page is developed, AHAS can provide information for the PDX airport vicinity by selecting "PORTLAND INTL" under the "Airfields" option.

i. **Strike Reporting and Promoting the BASH Program.** The 142 FW has an outstanding strike reporting program. All responsible organizations are well trained and motivated to collect post-strike remains and complete all required forms.

(1) **Recommendation.** Continue to report all strikes. Explore innovative ways to encourage reporting and collection of strike remains using briefings, videos, and posters.

(2) **Recommendation.** Conduct on-site training with unit staff with the Smithsonian/USDA Video titled "Bird Strikes: How to Collect, Ship Remains, and Have Bird Remains Identified" to staff periodically to promote strike reporting.

(3) **Recommendation.** Share strike reports with the civilian airport staff and ATC staff in an effort to develop a consolidated picture of bird strike risk periods.

APPENDIX 2. **BIRDS OBSERVED IN THE VICINITY OF PORTLAND INTERNATIONAL AIRPORT**

This list was compiled from observations made during the most recent BASH Site Visit in 2016, strike records from the USAF AFSAS Database (2006-2015), and strikes listed in the FAA National Wildlife Strike Database by the civilian airport (2006-2015). This list includes moderate to high risk hazardous wildlife species observed or documented in the vicinity of the airport. However, this is not a complete list of all observed wildlife or an exhaustive list of potentially hazardous species. Rare and low hazard bird species may have been eliminated from the following list for brevity.

Wildlife movements, patterns, and population numbers are dynamic and risk associated with currently observed or new species observed in the area will fluctuate. The lists may be supplemented with local observations and should be reviewed, at a minimum, during the annual review of the BASH Plan. Species with an asterisk (*) were observed during the 2016 NGB BASH Site Visit.

Pelecaniformes – Pelicans and Allies

Double-crested Cormorant	*Phalacrocorax auritus*

Anseriformes – Waterfowl

Tundra Swan	*Cygnus columbianus*
Canada Goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
Northern Pintail	*Anas acuta*
American Wigeon	*Anas americana*
Northern Shoveler	*Anas clypeata*
Green-winged Teal	*Anas crecca*
Greater White-fronted Goose	Anser albifrons
Snow Goose	*Chen caerulescens*
Gadwall	*Anas strepera*
Blue-winged Teal	*Anas discors*
Cinnamon Teal	*Anas cyanoptera*
Wood Duck	*Aix sponsa*
Canvasback	*Aythya valisineria*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Barrow's Goldeneye	*Bucephala islandica*
Common Goldeneye	Bucephala clangula
Bufflehead	*Bucephala albeola*
Common Merganser	*Mergus merganser*
Hooded Merganser	*Lophodytes cucculatus*
Ruddy Duck	*Oxyura jamaicensis*

Falconiformes – Vultures, Hawks, and Falcons

Turkey Vulture	*Cathartes aura*
Rough-legged Hawk	*Buteo lagopus*
Red-tailed Hawk	*Buteo jamaicensis*
Bald Eagle	*Haliaeetus leucocephalus*
Osprey	*Pandion haliaetus*
American Kestrel	*Falco sparverius*
Northern Harrier	*Circus cyaneus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Merlin	*Falco columbarius*

Ciconiiformes – Herons and Egrets

Great Blue Heron	*Ardea herodias*

Gruiformes – Cranes and Allies

Sandhill Crane	*Grus canadensis*

Charadriiformes – Shorebirds and Gulls

Killdeer	*Charadrius vociferous*
Mew Gull	*Larus canus*
Herring Gull	*Larus argentatus*
California Gull	*Larus californicus*
Ring-billed Gull	*Larus delawarensis*
Glaucous-winged Gull	*Larus glaucescens*
Semipalmated Plover	*Charadrius semipalmatus*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Spotted Sandpiper	*Actitis macularia*
Dunlin	*Calidris alpina*
Least Sandpiper	*Calidris minutilla*
Western Sandpiper	*Calidris mauri*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Red-necked Phalarope	*Phalaropus lobatus*
Wilson's Snipe	*Gallinago gallinago*
Glaucous Gull	*Larus hyperboreus*
Thayer's Gull	*Larus thayeri*
Western Gull	*Larus occidentalis*

Strigiformes – Owls

Barn Owl	*Tyto alba*
Great Horned Owl	*Bubo virginianus*

Columbiformes – Pigeons and Doves	
Rock Pigeon	*Columba livia*
Mourning Dove	*Zenaida macroura*
Passeriformes – Perching Birds	
Barn Swallow	*Hirundo rustica*
Cliff Swallow	*Hirundo pyrrhonota*
Vaux's Swift	*Chaetura vauxi*
American Crow	*Corvus brachyrhynchos*
American Robin	*Turdus migratorius*
European Starling	*Sturnus vulgaris*
Red-winged Blackbird	*Agelaius phoeniceus*
Brewer's Blackbird	*Euphagus cyanocephalus*
Brown-headed Cowbird	*Molothrus ater*
Western Kingbird	*Tyrannus verticalis*
Streaked Horned Lark	*Eremophila alpestris strigata*
Horned Lark	*Eremophila alpestris*
Common Raven	*Corvus corax*
Gaviiformes – Loons	
Common Loon	*Gavia immer*
Podicipediformes – Grebes	
Horned Grebe	*Podiceps auritus*
Eared Grebe	*Podiceps nigricollis*
Pied-billed Grebe	*Podilymbus podiceps*

APPENDIX 3. **LIST OF BASH REFERENCES**

1. **General.** This appendix includes sources of information and points of contact for BASH related issues.

2. **Technical Points of Contact.** The following are available to discuss specific bird and wildlife hazard issues:

a. **National Guard Bureau, Safety Office:**
HQ NGB/SEF
Lt Col Craig Babbitt
ANGRC, JB Andrews, MD 20762
DSN: 612-8549
Comm: (240) 612-8549
Mobile: (301) 675-2362
craig.r.babbitt.mil@mail.mil
Org Inbox: usaf.jbanafw.ngb-se.mbx.sef-flight-safety@mail.mil

b. **USAF BASH Team:**
HQ AFSC/SEFW
Mr. Daniel Sullivan
9700 Ave G., SE
Building 24499
Kirtland AFB, NM 87117-5671
DSN 246-5679
(505) 846-5679
daniel.Sullivan@kirtland.af.mil

c. **FAA:**
FAA – Airports
Mr. John Weller
800 Independence Ave, SW, Rm 615
Washington D.C. 20591
(202) 267-3778
john.Weller@faa.gov

d. **Port of Portland**
PDX Wildlife Hazard Management Program
Aviation Wildlife Manager
7200 NE Airport Way
Portland OR 97218
Phone (503) 460-4179
https://www2.portofportland.com/Inside/WildlifeManagement

e. **Consultant:**
Environmental Resource Solutions, Inc.
POC: Sarah Brammell
8711 Perimeter Park Blvd, Suite 1
Jacksonville, FL 32216
Direct Line: (813) 404-3963
Main Office: (904) 285-1397
FAX: (904) 285-1929
sbrammell@ersenvironmental.com
www.ersenvironmental.com

f. **AHAS Technical Assistance:**
DeTect Inc.
POC: Ron Merritt or Ron White
DeTect, Incorporated
1022 West 23rd Street, Suite 620
Panama City, Florida 32401
Main Office: (850) 763-7200
Ron Merritt email: bashman@aol.com

g. **USDA/APHIS/WS:**
US Department of Agriculture, Wildlife Services:
Oregon Wildlife Services State Director
6135 NE 80th Ave., Suite A-8
Portland, OR 97218
Phone (503) 326-2346
https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage

3. **Resource Websites and Reports.** The following resources provide references for bird/wildlife hazards:

a. **Air Force Safety Center website:**
http://www.afsec.af.mil/aviationsafetydivision/bash/index.asp
This website provides USAF specific guidance, instructional videos, links to AFSAS for strike reporting, links to AHAS, BASH publications and forms, strike statistics, and other related information.

b. **FAA Wildlife Hazard Mitigation Website:**
http://www.faa.gov/airports/airport_safety/wildlife
This website provides FAA specific guidance and links to the FAA National Wildlife Strike Database, wildlife strike resources, research and development, Frequently asked questions, and list current "hot" items.

c. Cleary, E.C. and R.A. Dolbeer. 2005. **Wildlife Hazard Management at Airports: A Manual for Airport Operators.** United States Department of

Transportation, Federal Aviation Administration, Office of Safety and Standards. Washington DC.
Available at: http://www.faa.gov/airports/airport_safety/wildlife

d. **FAA/USDA Wildlife Strikes to Civil Aircraft in the United States 1990-2014** (or current version).
Available at: http://www.faa.gov/airports/airport_safety/wildlife

4. **List of FAA Advisory Circulars and CertAlerts** related to wildlife hazard management. While not directly applicable to USAF requirements, these documents can provide resource information on specific topics and provide references for joint use facilities operating on a civilian airfield.

FAA Advisory Circulars	
FAA AC 150/5200-18	Airport Safety Self-Inspection
FAA AC 150/5200-32	Reporting Wildlife Aircraft Strikes
FAA AC 150/5200-33	Hazardous Wildlife Attractions on or Near Airports
FAA AC 150/5200-34	Construction or Establishment of Landfills Near Public Airports
FAA AC 150/5200-36	Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports
FAA AC 150/5220-25	Airport Avian Radar Systems
FAA Office of Safety and Standards CertAlerts	
CertAlert 98-05	Grasses Attractive to Hazardous Wildlife
CertAlert 04-09	Relationship Between FAA and WS
CertAlert 04-16	Deer Hazard to Aircraft and Deer Fencing
CertAlert 06-07	Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-listed Threatened and Endangered Species and Species of Special Concern on Airports
CertAlert 09-10	Wildlife Hazard Assessments in Accordance with Part 139 Requirements
CertAlert SO-12-3	Documenting the Review of your Wildlife Hazard Management Plan (WHMP)

5. **Meetings.** Related Scientific and Professional Meetings:

a. **Bird Strike Committee – USA (BSCUSA).**
This organization was formed in 1991 as a joint effort by the FAA, USAF, and USDA.

BSC USA facilitates the exchange of information, promotes the collection and analysis of accurate wildlife strike data, promotes the development of new technologies for reducing wildlife hazards, promotes professionalism in wildlife management programs on airports through training and advocacy of high standards of conduct for airport biologists and bird patrol personnel, and is a liaison to similar organizations in other countries. Bird Strike Committee – USA meets annually. For more information visit www.birdstrike.org

6. **Training Materials**

a. Additional videos and on-line source are available for a variety of topics. Contact the USAF BASH Team or the NGB for technical assistance.

7. **Technical Assistance:** The Air National Guard Environmental Division provides and coordinates technical assistance for wildlife hazards to aircraft operations in addition to the agencies listed below. **Please coordinate all requests for technical assistance through NGB.**

a. **National Guard Bureau, Safety Office:**
HQ NGB/SEF
Lt Col Craig Babbitt
ANGRC, JB Andrews, MD 20762
DSN: 612-8549
Comm: (240) 612-8549
Mobile: (301) 675-2362
craig.r.babbitt.mil@mail.mil
Org Inbox: usaf.jbanafw.ngb-se.mbx.sef-flight-safety@mail.mil

b. **USAF BASH Team:**
HQ AFSC/SEFW
Mr. Daniel Sullivan
9700 Ave G., SE
Building 24499
Kirtland AFB, NM 87117-5671
DSN 246-5679
(505) 846-5679
daniel.Sullivan@kirtland.af.mil

APPENDIX 4. **LIST OF PREPARERS**

This plan was prepared for, and under the direction of, the Air National Guard Safety Office (HQ NGB/SE) by Environmental Resource Solutions, Inc. It updates the previous ANG BASH Plan as last updated and follows USAF and ANG Operational Plan guidelines. Members of the professional staff are listed below:

Technical Analysis & Production:

ENVIRONMENTAL RESOURCE SOLUTIONS, INC.

Sarah Brammell, Qualified Airport Wildlife Biologist and Point of Contact
B.A. Biology – Susquehanna University
M.P.A. Public Administration/Environmental Policy – Florida Gulf Coast University

Amy Reed, Qualified Airport Wildlife Biologist
B.S. Wildlife Ecology and Conservation – University of Florida

Ron Merritt, Qualified Airport Wildlife Biologist and Senior Advisor
B.S. Zoology - University of Arkansas
M.S. Biology/Evolutionary Genetics - North Texas State University
Graduate Studies, PhD-ABD Environmental Physiology/Toxicology - University of North Texas
Retired USAF – Former USAF BASH

APPENDIX F Airport Plant List

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Airport Approved Plant List

		Scientific Name		Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web
Primary Zone	Shrubs	*Berberis*	*verruculosa*	Warty Barberry	Evergreen	3-5	3-5	http://oregonstate.edu/dept/ldplants/beve.htm
		Cornus	*sericea 'Kelseyi'*	Kelsey Dogwood ǂ	Deciduous	3	3	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=100
		Ilex	*crenata 'Helleri'*	Heller Japanese Holly	Evergreen	4	4	http://oregonstate.edu/dept/ldplants/ilcrh.htm
		Lavandula	*angustifolia*	English Lavender	Evergreen	2-3	2-4	http://plants.usda.gov/java/profile?symbol=LAAN81
		Rhododendron x	*'Girard's Purple'*	Girard's Purple Azalea	Evergreen	3-4	2-4	http://oregonstate.edu/dept/ldplants/rhgpur.htm
		Rosa	*meidiland var.*	Meidiland Rose Varieties	Evergreen	2.5-3		http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=c338
		Rosa	*'Red Flower Carpet'*	Red Flower Carpet	Evergreen	2.5		http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=b852
		Rosa	*'Radtko'*	Double Knock Out Rose	Evergreen	3-4	3-4	http://nassau.ifas.ufl.edu/horticulture/demogarden/printables/KnockOutDouble.pdf
		Spiraea	*betulifolia*	Birchleaf Spiraea ǂ	Deciduous	3	3	http://oregonstate.edu/dept/ldplants/spbet.htm
	Groundcovers	*Ajuga*	*reptans 'Burgundy Glow'*	Carpet Bugle	Evergreen	.5		http://oregonstate.edu/dept/ldplants/ajre-i.htm
		Calluna	*vulgaris*	Scotch Heather	Evergreen	.5-2	2+	http://oregonstate.edu/dept/ldplants/cavu.htm
		Ceanothus	*prostratus*	Mahala Mat	Evergreen	.5		http://plants.usda.gov/java/profile?symbol=CEPR
		Dicentra	*formosa*	Pacific Bleeding Heart	N/A	2	2	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=42
		Echinacea	*purpurea*	Purple Coneflower	N/A	5	2	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=162
		Juniperus	*horizontalis*	Creeping Juniper	Evergreen	1-1.5	10	http://oregonstate.edu/dept/ldplants/juho.htm
		Phlox	*spp.*	Native Phlox	N/A	.5-2		http://plants.usda.gov/java/ClassificationServlet?source=display&classid=PHLOX
		Phyllodoce	*spp.*	Mountain Heather	Evergreen	.5-1.5	.5-1.5	http://plants.usda.gov/java/profile?symbol=PHYLL3
		Polystichum	*munitum*	Sword Fern	Evergreen	4	7	http://www.pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=337
		Walsteinia	*fragaroides*	Barren Strawberry	Evergreen	.5		http://oregonstate.edu/dept/ldplants/wafr.htm
	Ornamental Grasses	*Calamagrostis*	*x acutiflora 'Overdam'*	Feather Reed Grass ǂ		2.5-3	1.5-2	http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=n750
		Festuca	*glauca*	Blue Fescue		1	1	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=52
		Ophiopogon	*japonicus 'Nana'*	Dwarf Mondo Grass				http://plants.usda.gov/java/profile?symbol=OPJA
		Ophiopogon	*planiscapus 'Nigrescens'*	Black Mondo Grass		.75-1	.75-1	http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=E400
		Pennisetum	*alopecuroides 'Hameln'*	Hameln Fountain Grass		1.5-2.5	1.5-2.5	http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=A680

*** Indicates measurements are not taken from the related website.**

ǂ Indicates preferred water quality plant species for swales and mitigation

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		Scientific Name		Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web
Secondary Zone	Plant at 25 ft on Center	*Acer*	*freemanii 'Armstrong'*	Armstrong Red Maple	Deciduous	50-70	15	http://oregonstate.edu/dept/ldplants/acfreea.htm
		Calocedrus	*decurrens*	Incense Cedar	Evergreen	75	15	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=30
		Cedrus	*deodara 'Aurea'*	Aurea Deodar Cedar	Evergreen	10-25	6-10*	http://oregonstate.edu/dept/ldplants/cedeaur.htm
		Chamaecyparis	*obtusa 'Gracilis'*	Slender Hinoki Falsecypress	Evergreen	20	6*	http://oregonstate.edu/dept/ldplants/chobg.htm
		Cryptomeria	*japonica 'Elegans'*	Japanese Plume Cedar	Evergreen	30	10	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=196
		Cryptomeria	*japonica 'Sekkan Sugi'*	Golden Japanese Cedar	Evergreen	25	10*	http://oregonstate.edu/dept/ldplants/crjass.htm
		Cupressocyparis	*leylandii 'Golconda'*	Gold Leyland Cypress	Evergreen	20	6	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=115
		Prunus	*sargentii 'Columnaris'*	Columnar Sargent Cherry	Deciduous	35	15	http://oregonstate.edu/dept/ldplants/prsac.htm
		Zelkova	*serrata 'Musashino'*	Musashino Zelkova	Deciduous	45	15	http://www.jfschmidt.com/pdfs/musashinozelkova.pdf
	Plant at 40 ft on Center	*Acer*	*buergeranum*	Trident Maple	Deciduous	25-35	20-30	https://plants.ces.ncsu.edu/plants/all/acer-buergerianum/
		Acer	*circinatum*	Vine Maple	Deciduous	10-20	20*	http://oregonstate.edu/dept/ldplants/acci.htm
		Acer	*ginnala*	Amur Maple	Deciduous	10-20	20*	http://oregonstate.edu/dept/ldplants/acgi.htm
		Acer	*griseum*	Paperbark Maple	Deciduous	20-30	25*	http://oregonstate.edu/dept/ldplants/acgr.htm
		Acer	*palmatum*	Japanese Maple	Deciduous	15-25	10-25*	http://oregonstate.edu/dept/ldplants/acpa.htm
		Fagus	*sylvatica 'Tricolor'*	Tricolor European Beech	Deciduous	20-30*	10-20*	http://oregonstate.edu/dept/ldplants/fasytri.htm
		Ginko	*biloba*	Ginko (males only)	Deciduous	50+	30	http://oregonstate.edu/dept/ldplants/gibi.htm
		Liquidambar	*styraciflua 'Rotundiloba'*	Rotundiloba Sweetgum	Deciduous	60-70*	20-30*	http://oregonstate.edu/dept/ldplants/listr.htm
		Magnolia x	*soulangiana*	Saucer Magnolia	Deciduous	15-20	15-25*	http://oregonstate.edu/dept/ldplants/maso.htm
		Malus x	*'Spring Snow'*	Spring Snow Crabapple	Deciduous	25-30	15-20	http://hort.ufl.edu/trees/MALXE.pdf
		Metasequoia	*glyptostroboides*	Dawn Redwood (height restricted)	Deciduous	70-100	15-25*	http://oregonstate.edu/dept/ldplants/megl.htm
		Oxydendrum	*arboreum*	Sourwood	Deciduous	25-60	10-25	http://oregonstate.edu/dept/ldplants/oxar.htm
		Parrotia	*persica*	Persian Parrotia	Deciduous	40	25	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=326
		Pinus	*ponderosa*	Ponderosa Pine (height restricted)	Evergreen	60-100	25-30*	http://oregonstate.edu/dept/ldplants/pipo.htm
		Prunus	*serrulata 'Shirotae'*	Mt Fuji Cherry	Deciduous	12-15	20	http://oregonstate.edu/dept/ldplants/prsem.htm
		Pyrus	*calleryana 'Cleveland Select'*	Cleveland Select Flowering Pear	Deciduous	30-35*	15-20*	http://www.advancedtree.com/tree_clevelandpear.htm
	Plant at 60 ft on Center	*Acer*	*rubrum var.*	Red Maple	Deciduous	60-75	30-50*	http://oregonstate.edu/dept/ldplants/acru.htm
		Carpinus	*betulus*	European Hornbeam	Deciduous	40-60	30-40*	http://oregonstate.edu/dept/ldplants/cabe.htm
		Fraxinus	*americana 'Autumn Purple'*	Autumn Purple Ash	Deciduous	45-60*	35-50*	http://oregonstate.edu/dept/ldplants/framap.htm
		Fraxinus	*pennsylvanica*	Green Ash (seedless varieties only)	Deciduous	50	40	http://oregonstate.edu/dept/ldplants/frpem.htm
		Gleditsia	*tricanthos var. inermis*	Thornless Honeylocust	Deciduous	30-70	30-40*	http://oregonstate.edu/dept/ldplants/gltri.htm
		Platanus x	*acerifolia*	London Planetree (height restricted)	Deciduous	70-100	60-75*	http://oregonstate.edu/dept/ldplants/plac.htm
		Quercus	*coccinea*	Scarlet Oak	Deciduous	75	45	http://oregonstate.edu/dept/ldplants/quco-i.htm
		Tillia	*americana*	American Linden	Deciduous	60-80	30-50*	http://oregonstate.edu/dept/ldplants/tiamer.htm
		Tillia	*chordata*	Littleleaf Linden	Deciduous	60-70	25-40*	http://oregonstate.edu/dept/ldplants/tico.htm
	Shrubs	*Abelia x*	*grandiflora 'Prostrata'*	Prostrate Glossy Abelia	Evergreen	1.5-2	4-5	https://plants.ces.ncsu.edu/plants/all/abelia-x-grandiflora-prostrata/
		Berberis	*thunbergii var. atropurpurea 'Crimson Pygmy'*	Crimson Pygmy Japanese Barberry	Deciduous	2	3	http://oregonstate.edu/dept/ldplants/bethacp.htm
		Berberis	*thunbergii 'Kobold'*	Kobold Japanese Barberry	Deciduous	2-2.5*	2-2.5*	http://oregonstate.edu/dept/ldplants/bethk.htm
		Buxus	*sempervirens 'Suffruticosa'*	English Boxwood	Evergreen	4-5	2-4*	http://oregonstate.edu/dept/ldplants/buses.htm
		Ceanothus	*thyrsiflorus*	Blue Blossom	Evergreen	4-12	Variable	http://oregonstate.edu/dept/ldplants/ceth-i.htm
		Chamaecyparis	*obtusa 'Nana Lutea'*	Nana Lutea Hinoki Falsecypress	Evergreen	6	4	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=164
		Cistus	*spp.*	Rockrose species	Evergreen	Variable	Variable	http://oregonstate.edu/dept/ldplants/1plants.htm#ciannp
		Clematis	*armandii*	Evergreen Clematis	Evergreen	20	Variable	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=261
		Corylopsis	*glabrescens*	Fragrant Winterhazel	Deciduous	8-15	8-15	http://oregonstate.edu/dept/ldplants/cospp.htm
		Cotinus	*coggygria*	Common Smoketree	Deciduous	10-15	10-15	http://oregonstate.edu/dept/ldplants/cocog.htm
		Daphne	*spp.*	Daphne	Evergreen	3-4	2-3*	http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderProfileResults.aspx?gen=Daphne
		Enkianthus	*campanulatus*	Redvien Enkianthus	Deciduous	6-8	4-6*	http://oregonstate.edu/dept/ldplants/enca-i.htm
		Erica	*spp.*	Heath	Evergreen	1-2	1-2*	http://oregonstate.edu/dept/ldplants/1plants.htm#Erica
		Euonymus	*alatus 'Compactus'*	Compact Winged Burning Bush	Deciduous	8-10	9-11*	http://oregonstate.edu/dept/ldplants/eualc.htm
		Euonymus	*fortunei*	Wintercreeper Euonymus	Evergreen	1-3	2-4	http://oregonstate.edu/dept/ldplants/eufo.htm
		Forsythia	*spp.*	Forsythia	Deciduous	8-10	10-12	http://oregonstate.edu/dept/ldplants/foin.htm

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		Scientific Name		Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web
Secondary Zone	Shrubs	*Hamamelis x*	*intermedia 'Diane'*	Diane Witchhazel	Deciduous	8-12*	10-15*	http://oregonstate.edu/dept/ldplants/haind.htm
		Hydrangea	*macrophylla*	Bigleaf Hydrangea var.	Deciduous	4-6	4-6	http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=K550
		Kerria	*japonica*	Japanese Kerria	Deciduous	4-8	6-9*	http://oregonstate.edu/dept/ldplants/keja.htm
		Leucothoe	*fontanesiana*	Drooping leucothoe	Evergreen	3-6	3-6	http://oregonstate.edu/dept/ldplants/lefo-i.htm
		Nandina	*domestica 'Gulf Stream'*	Gulf Stream False Bamboo ǂ	Evergreen	2.5-3.5	3*	https://plants.ces.ncsu.edu/plants/all/nandina-domestica-gulf-stream/
		Potentilla	*fruitcosa*	Bush Cinquefoil	Deciduous	2-4	2-4	http://oregonstate.edu/dept/ldplants/pofr-i.htm
		Rhododendron	*griffithianum 'Jean Marie'*	Honorable Jean Marie Rhododendron	Evergreen	5-6	5-6*	http://oregonstate.edu/dept/ldplants/rhthei.htm
		Rhododendron	*macrophyllum*	Western Rhododendron	Evergreen	6-12		http://oregonstate.edu/dept/ldplants/rhmac.htm
		Rhododendron	*spp. P.J.M.*	P.J.M. Rhododendron	Evergreen	3-6	6*	http://oregonstate.edu/dept/ldplants/rhpjm.htm
		Rhus	*typhina 'Laciniata'*	Laceleaf Staghorn Sumac	Deciduous	10-20	10-20*	http://oregonstate.edu/dept/ldplants/rhtyl-i.htm
		Rosa	*gymnocarpa*	Little Wood Rose	Deciduous	6	2-4*	http://oregonstate.edu/dept/ldplants/rogym.htm
		Rosa	*nutkana*	Nootka Rose	Deciduous	3-6	6*	http://oregonstate.edu/dept/ldplants/ronut.htm
		Salix	*purpurea 'Nana'*	Dwarf Alaskan Blue Willow ǂ	Deciduous	5	3-5*	http://oregonstate.edu/dept/ldplants/sapun.htm
		Spiraea	*douglasii*	Douglas Spiraea	Deciduous	3-7	3-7	http://oregonstate.edu/dept/ldplants/spdoug.htm
		Taxus	*baccata 'Repandens'*	Spreading English Yew	Evergreen	2-4	12-15	http://oregonstate.edu/dept/ldplants/tabar.htm
		Taxus	*baccata 'Standishii'*	Standishii Yew	Evergreen	7*	3*	http://oregonstate.edu/dept/ldplants/tabas.htm
	Groundcovers	*Arctostaphylos*	*uva-ursi (* cultivars)	Kinnikinnick	Evergreen	.5-1.5	3-6*	http://oregonstate.edu/dept/ldplants/aruv.htm
		Genista	*pilosa*	Silkyleaf Broom	Deciduous	1-1.5	2-3*	http://oregonstate.edu/dept/ldplants/gepi.htm
		Hemerocallis	*hybrida*	Day Lily	Deciduous	1-3		https://plants.ces.ncsu.edu/plants/all/hemerocallis-hybrida/
		Iberis	*sempervirens*	Evergreen Candytuft	Evergreen	1-2	3-4*	http://oregonstate.edu/dept/ldplants/ibse-i.htm
		Liriope	*muscaria*	Lily Turf	Evergreen	1-2	.5-1	https://plants.ces.ncsu.edu/plants/all/liriope-muscaria/
		Pachysandra	*terminalis*	Japanese Spurge	Evergreen	1	2	http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=128
		Paxistima	*canbyi*	Canby Paxistima	Evergreen	1-1.5		http://oregonstate.edu/dept/ldplants/pacan.htm
		Sedum	*spp.*	Sedum	Deciduous			http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Sedum
	Grasses and Sedges	*Bromus*	*vulgaris*	Columbia Brome				http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1220
		Calamagrostis x	*acutifolia 'Overdam'*	Overdam Feather Reed Grass		2.5-3	1.5-2	http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=N750
		Carex	*morrowii 'Evergold'*	Evergold Japanese Sedge				http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=s140
		Carex	*tumulicola*	Splitawn Sedge				http://plants.usda.gov/java/profile?symbol=CATU3
		Danthonia	*californica*	California Oatgrass		2		http://plants.usda.gov/java/profile?symbol=DACA3

*** Indicates measurements are not taken from the related website.**

(height restricted) refers to specific species being limited in usage to areas outside of height restricted zones.

ǂ Indicates preferred stormwater plant species

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APPENDIX G PDX Wildlife Deterrent Fencing

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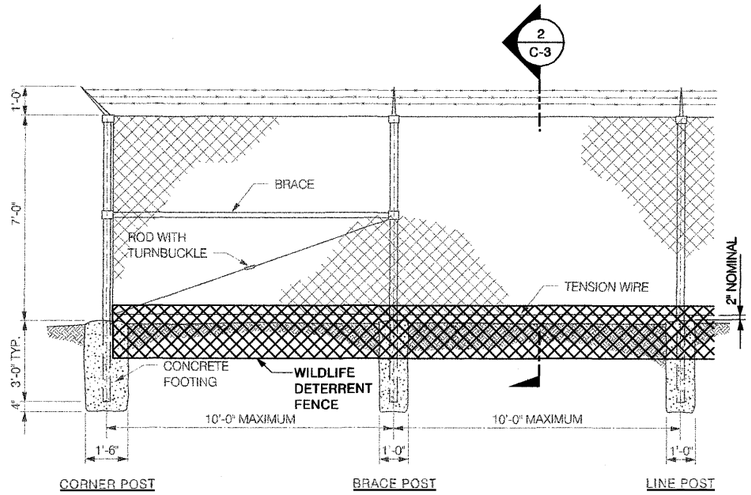
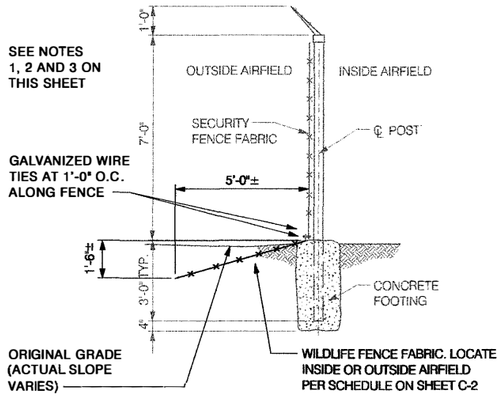


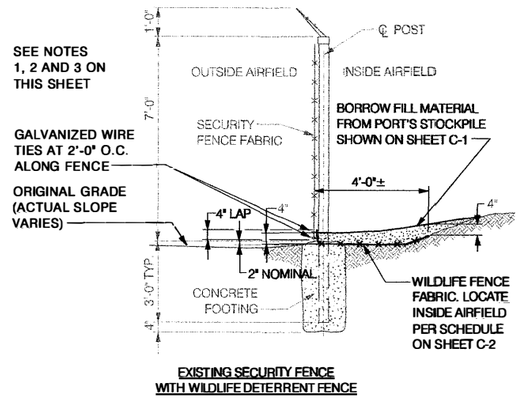
EXISTING SECURITY FENCE WITH WILDLIFE DETERRENT FENCE

ELEVATION 1
SCALE: 3/8"=1'-0"



EXISTING SECURITY FENCE WITH WILDLIFE DETERRENT FENCE (TYPICAL EXCEPT AS SHOWN ON SECTION 2A/C-3)

SECTION 2
SCALE: 3/8"=1'-0"

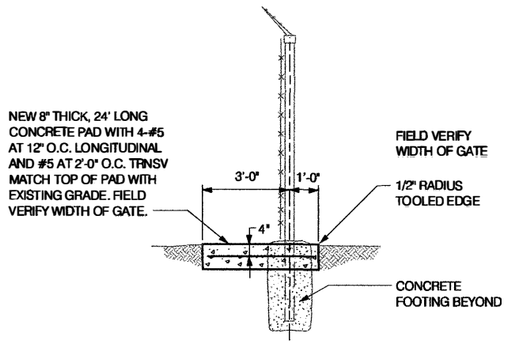


EXISTING SECURITY FENCE WITH WILDLIFE DETERRENT FENCE

NOTE:

THIS SECTION APPLIES ONLY TO 335 LF OF FENCE BETWEEN POINTS 6 AND 7; 80 LF BETWEEN POINTS 42 AND 43; AND 100 LF BETWEEN POINTS 57 AND 58.

SECTION 2A
SCALE: 3/8"=1'-0"



CONCRETE PAD AT GATES

DETAIL 3
SCALE: 3/8"=1'-0"

NOTES:

1. MAINTAIN SECURITY FENCE INTEGRITY AT ALL TIMES. DO NOT LEAVE EXCAVATION UNDER FENCE FABRIC WHICH WOULD PERMIT ACCESS.
2. DEPTH OF EXCAVATION SHALL BE INSPECTED AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT OF THE CHAIN LINK FENCE FABRIC.
3. END JOINTS BETWEEN ADJACENT SECTIONS OF WIRE FABRIC SHALL BE LAPPED 4" AND TIED WITH GALVANIZED WIRE TIES AT 2'-0" O.C. AND AT EDGES.

FEDERAL AVIATION ADMINISTRATION

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PORTLAND INTERNATIONAL AIRPORT

WILDLIFE DETERRENT FENCE

APPENDIX H Avian Point Count Protocol

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PDX Avian Point Count Protocol

Equipment

1. WIS data collection program
2. Point Count Location layer (enable in WIS)
3. Stopwatch
4. Binoculars
5. Scope
6. The Sibley Guide to Birds

Timing of Weekly Bird Count

The bird count will alternate each week from morning to afternoon.

- The morning point count will begin as close to 1 hour after sunrise as possible.
- The afternoon point count will begin at 1200 or no later than 1400.

Procedures

1. There are 12 points in all, evenly distributed across the airfield. Each point should allow you to view birds in the area within the radius shown on the point count location map. All of the points combined will cover the airfield entirely.
2. Always start with site #1 and end with site #12.
3. At each location, allow 1 minute to get acclimated to the site and to allow birds to settle. Once this wait period is over, set the timer for 5 minutes and begin recording observations. Any activity seen outside of this 5 minute period should not be recorded to maintain the accuracy and consistency of the data. When recording observations, be sure to note the grid location, species, number, and activity of the bird.

Dispersals

Normally, no dispersals will take place during the survey because of the chance that the same bird will be documented at different locations. If a situation arises where a bird is observed at a location which causes a concern for aircraft safety, the person conducting the count will record the bird and location, and then either contact the hazing person on duty, or disperse the bird themselves. If hazing is required during the count, it will be recorded in the data as a separate entry from the point count survey data.