

# **WILDLIFE HAZARD MANAGEMENT PLAN**

## **SEATTLE-TACOMA INTERNATIONAL AIRPORT**

Appendix 1 of the SEA Airport Certification Manual  
FAR 139.337, Amended June 4, 2004

*Maximize Safety Now...*

*Minimize Future Risk...*

*Developed by*

**Port of Seattle**

**Seattle-Tacoma International Airport**

P.O. Box 68727

Seattle, WA 98168-0727

*In Cooperation with*

**U.S. Department of Agriculture**

**Animal and Plant Health Inspection Service**

**Wildlife Services**

720 O'Leary St., NW

Olympia, WA 98502



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## EXECUTIVE SUMMARY

Pursuant to CFR Title 14 FAR part 139.337(e), the Port of Seattle's Seattle-Tacoma International Airport (SEA) developed this Wildlife Hazard Management Plan (WHMP) in cooperation with the U.S. Department of Agriculture's Wildlife Services program to replace the Port's earlier Wildlife Hazard Management Plan, which is already in place and approved by the FAA. This plan will be reviewed periodically by the Wildlife Hazard Working Group and will be updated if changing circumstances merit. All changes made to the WHMP will be sent to the FAA for approval.



The plan places a particular emphasis on identification and abatement of wildlife hazards within the airfield environment. Habitat on and around the airfield will be managed in a manner that is non-conducive to hazardous wildlife, and the plan outlines priorities for habitat management, including target dates for completion. Additional wildlife attractants (e.g., lakes, ponds, landfills, etc.) within 5 miles of the airfield are also addressed as they could potentially attract wildlife in a manner that could jeopardize safety of air traffic operating into and out of SEA.

SEA will take immediate measures to identify and mitigate wildlife hazards whenever they are detected or whenever airport management has been advised that hazardous conditions exist. The plan outlines steps for monitoring, documenting, and reporting potential wildlife hazards and strikes at SEA. Protocols for responding to hazardous wildlife situations are presented, including roles and responsibilities of airport personnel. Wildlife control procedures for birds and mammals are also discussed.

Most wildlife is afforded some type of protection under state or federal regulations; therefore, special permits may be required for their control. The plan outlines laws and regulations governing the harassment or take of various types of wildlife. SEA's permit status for each type of wildlife is presented in tabular format. Because permits are renewed as frequently as every 90-days in the case of the bald eagle harassment permit, copies of the various state and federal permits will be stored with the POS Wildlife Biologist and made available on request.

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SEA will maintain an adequate supply of resources for dispersing and controlling wildlife, including frightening devices (e.g., pyrotechnics, Mylar flash tape), wildlife restraint equipment (e.g., traps, catch poles), and shotguns. SEA personnel will be trained to properly identify wildlife and apply wildlife deterrent equipment in a safe and efficient manner.

A site-specific monitoring plan was developed to detect and respond to wildlife hazards that may unexpectedly occur at any of the wetland mitigation sites associated with the Master Plan Update Projects and WSDOT State Route 509 site located south of the third runway. A flow chart was developed to accurately assess the level of wildlife hazards associated with these sites and to augment implementation of the appropriate control response under various circumstances. If the hazards cannot be mitigated to an acceptable level with traditional methods, the sites may have to be altered. Significant alteration of these sites may require agency consultation and/or certain environmental permits and replacement mitigation.



**On September 27, 1990 this Boeing 727 struck a common loon on departure from SEA.**

## SIGNATORIES

The following Wildlife Hazard Management Plan for Seattle-Tacoma International Airport has been reviewed and accepted by the FAA. This document will become effective with the following signatures:

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Steve Osmek, POS Wildlife Biologist/Wildlife Coordinator  
Port of Seattle

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Date

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Lynn Deardorff, Certification Inspector  
Federal Aviation Administration

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Date

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Laurence Schaffer, Staff Wildlife Biologist  
USDA-Wildlife Services

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Date

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Damage resulting from a high speed strike with a single gull.

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## LIST OF ACRONYMS

<b>ADM</b>	Airport Duty Manager
<b>ADO</b>	Airports District Office
<b>AGL</b>	Above Ground Level
<b>AMA</b>	Aircraft Movement Area
<b>AOA</b>	Air Operations Area
<b>AOS</b>	Airport Operations Specialist
<b>ATCT</b>	Air Traffic Control Tower
<b>ATIS</b>	Automated Terminal Information Service
<b>CFR</b>	Code of Federal Regulations
<b>DCRDF</b>	Des Moines Creek Regional Detention Facility
<b>FAA</b>	Federal Aviation Administration
<b>FAR</b>	Federal Aviation Regulations
<b>NOTAM</b>	Notice to Airmen
<b>POS</b>	Port of Seattle
<b>SEA</b>	POS, Seattle-Tacoma International Airport
<b>SIDA</b>	Security Identification Display Area
<b>SOG</b>	Standard Operating Guideline
<b>USDA</b>	United States Department of Agriculture
<b>USFWS</b>	United States Fish and Wildlife Service
<b>WDFW</b>	Washington Department of Fish and Wildlife
<b>WDOE</b>	Washington Department of Ecology
<b>WHMP</b>	Wildlife Hazard Management Plan
<b>WHWG</b>	Wildlife Hazard Working Group
<b>WS</b>	USDA, Wildlife Services
<b>WSDOT</b>	Washington State Department of Transportation



Nr 1 - C-130 Strikes Bald Eagle  
Tacoma Area - 2005



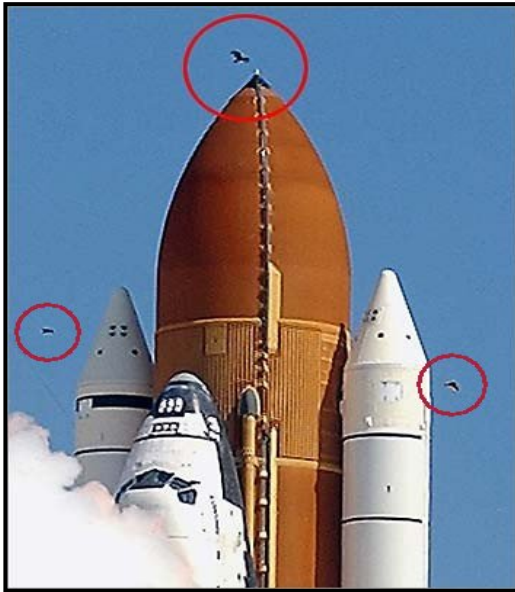
Nr 2 - C-130 Strikes Bald Eagle  
Tacoma Area - 2005

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## Vulture Impacts External Fuel Tank on Space Shuttle Launch

"As if the shuttle program has not already been through enough, Discovery sustained a low-speed bird strike at lift-off. Before it had even cleared the Pad 39B umbilical tower the nose of the external tank struck which analysis indicates was probably a several-pound vulture, which bounced off the tank and fell lifeless along the backside of the tank instead of toward the orbiter windshield. It was vaporized by rocket plumes."

Webmasters      Comment:  
There was no mention of the other 2 birds (left and right of the external rocket boosters). Presumably they were also vaporized by the rocket plumes.





# 1.0 - INTRODUCTION

## 1.1 - OVERVIEW

A Wildlife Hazard Management Plan (WHMP) establishes the responsibilities, policies, resources, and procedures recommended by the Wildlife Hazard Working Group (WHWG) to reduce wildlife hazards at a given airport. Recognizing the potential hazards wildlife pose to aircraft and human lives, the Federal Aviation Administration (FAA) requires airports that incur wildlife-aircraft strikes implement a plan according to Code of Federal Regulations (CFR) Title 14 Federal Aviation Regulations (FAR) Part §139.337(f) as amended June 9, 2004. Accordingly, this document must include 7 required components. Each component is represented herein as separate chapter. Provisions in CFR Title 14 FAR Part §139.337 allow the WHMP to be promptly modified and updated to address new situations or changing circumstances. To augment compliance with these regulations, the FAA issued a CERTALERT No. 97-09 as a resource to airports for developing their WHMP.

## 1.2 - PURPOSE AND SCOPE

Enhancing safe air carrier operations is a primary objective of the Port of Seattle (POS). Accomplishing this objective entails careful monitoring of all aspects of arriving and departing aircraft in the vicinity of SEA, including potential wildlife hazards on and around the airport. As part of its on-going safety efforts, SEA intends to implement and maintain a WHMP according to CFR Title 14 FAR part 139.337 to address potential wildlife hazards at SEA and surrounding areas, with a particular emphasis on hazards and wildlife attractants within approximately 2 miles of the airfield (Appendix A). In addition to addressing general wildlife hazards, this plan will discuss habitat modification, monitoring and responding to potential wildlife hazards associated with recently constructed wetland mitigation sites. A total of 10 wetland sites, occurring in two watersheds, are being systematically monitored for hazardous wildlife near SEA (See Section 9). The Lake Reba area serves as a control site, a site where no wetland mitigation enhancements have been conducted. Per a formal agreement between the State of Washington and the Port of Seattle, the SR 509 Wetland Mitigation Site, owned by the state, will be monitored in perpetuity by an airport wildlife biologist contracted by WA State. The USDA Wildlife Services is currently monitoring their site under contract with the WA Department of Transportation (WSDOT).

**Table 1. Wildlife strikes recorded at SEA during 2007.**

Species	Inside 10,000'			Grand Total
	Critical Zone		Yes	
	Unknown	No	Yes	
Unknown bird	16	13	15	44
Gull spp.			5	5
American Kestrel			4	4
Swallow spp.			6	6
American Crow			2	2
Red-Tail Hawk			2	2
European Starling/Blackbird			3	3
American Robin			1	1
Black Turnstone			1	1
Cormorant, Dbl Crested			1	1
Horned Lark			1	1
Killdeer			1	1
Western Meadowlark			1	1
Western Sandpiper			1	1
Burrowing Owl		1		1
Fox Sparrow		1		1
Warbler spp.		1		1
<b>Grand Total</b>	<b>16</b>	<b>16</b>	<b>44</b>	<b>76</b>

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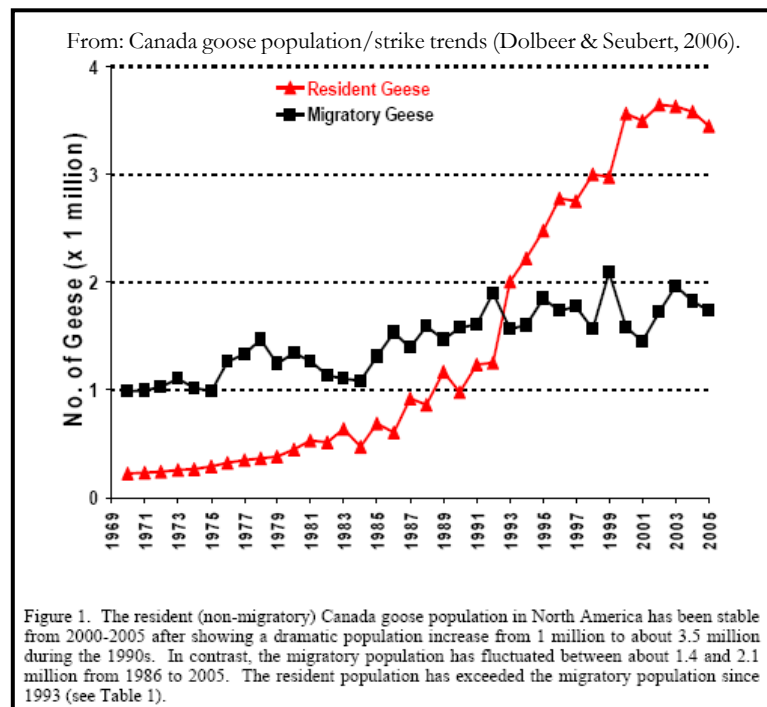
It is important to note that Part 139.337(f) underscores the need for a flexible plan that can be quickly adapted to changing circumstances. In some rare cases, however, immediate actions may be necessary that are not addressed in this plan to ensure the safety of airport patrons. This plan provides SEA with the discretion and capability to respond to these situations, while providing guidance for compliance with applicable federal, state, and municipal laws or regulations. The latitude afforded SEA management when administering this plan is discussed in CFR 14 - Part 139.113 Deviations, which states that::

*“In emergency conditions requiring immediate action for the protection of life or property, involving the transportation of persons by air carriers, the certificate holder may deviate from any requirement of Subpart D of this part to the extent required to meet that emergency. Each certificate holder who deviates from a requirement under this paragraph shall, as soon as practicable, but no later than 14 days after the emergency, report in writing to the Regional Airports Division Manager stating the nature, extent, and duration of the deviation.”*

This plan will be valid until SEA management or FAA determines that the plan should be updated due to changed conditions or new needs for action. The plan will be reviewed at least annually to ensure it still pertains to conditions at the time of review, but it may also be revisited more often if a hazardous situation emerges that merits further evaluation.

### 1.3 - PROBLEM SPECIES AT SEA

The animals generally considered to present the greatest threats to aviation at SEA are birds, especially those that flock and/or are large in size, such as waterfowl, gulls, rock pigeons, European starlings, and raptors. Coyotes and domestic dogs are also a hazard, but unlike most birds, they can often be kept off the active surfaces using a well maintained deterrent perimeter fence. Juvenile and migratory animals may also pose higher risks for aviation because of their general unfamiliarity with the airport environment. For some species such as raptors, it may be advisable to mark resident adults and monitor their activities near the airfield where they have been observed at SEA to actively drive immature and migrating raptors away from the area. In contrast, attempts should be made to relocate or otherwise disperse all the young red-tailed hawks produced by these resident raptors. Other raptors should be relocated from the airport environment as these birds can also be struck and cause aircraft damage.



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## 2.0 - AUTHORITY

*FAR 139.337(f)(1) A list of the individuals having the authority and responsibility for implementing each aspect of the plan.*

### 2.1 - OVERVIEW

In 2001, the Manager of Airport Operations designated the POS Wildlife Biologist to be the Wildlife Coordinator, the individual responsible for implementing the WHMP. Each department and associated agencies have responsibilities outlined below and must incorporate them into their respective programs. Clear communication among airport personnel and these agencies is essential for the WHMP to effectively respond to emerging wildlife issues and succeed. Personnel working at the airport will communicate resource needs, recommendations and progress to the Wildlife Coordinator. The POS Wildlife Biologist, in conjunction with the Manager of Airfield Certification will ensure that the WHMP is updated as needed, approved by the FAA, and reviewed by the USDA, Wildlife Services. All updates must comply with federal, state, and local laws and regulations.

### 2.2 - WILDLIFE HAZARD WORKING GROUP

The Wildlife Hazard Working Group (WHWG) is responsible for reviewing the WHMP at least annually, but more frequently if needed. During this reevaluation, the responsible member from each group or agency should review their departmental duties, monitor their activities and make recommendations to the POS Wildlife Biologist, who will in-turn review and grant approval if satisfied with the progress of the WHMP. The Wildlife Hazard Working Group should be attended by a member or a representative from each of these subgroups below:

1. Port of Seattle
  - a. Wildlife Coordinator (POS Wildlife Biologist)
  - b. Certification Manager of the Airfield
  - c. Airport Duty Manager (ADM)
  - d. Airfield Operations Specialist (AOS)
  - e. Airfield Maintenance
  - f. Aviation Environmental, Engineering, Facilities and Infrastructure, Planning, Project Management
  - g. POS Police
  - h. Media Relations
2. Federal Aviation Administration
  - a. Airport Certification Safety Inspector
3. USDA, Wildlife Services
  - a. USDA Wildlife Biologist
4. Falcon Research Group Inc.
  - a. Raptor Biologist

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## 2.3 - PERSONS RESPONSIBLE FOR IMPLEMENTING THE PLAN

Implementation of the WHMP can only be effectively accomplished with the collective efforts of many individuals and several agencies. One important group responsible for maintaining aviation safety on a daily basis is the **SEA Wildlife Patrol** (denoted by ☒ below). This group consists of the POS Wildlife Biologist, Airport Certification Manager, Airport Duty Managers (ADM), Airfield Operations Specialists (AOS), and other personnel certified to use firearms, pyrotechnics or trapping techniques to control hazardous wildlife in accordance with the applicable POS Standard Operating Guideline (SOG).

### 2.3.1 - Port of Seattle

#### ☒ **Wildlife Coordinator (Port of Seattle Airport Wildlife Biologist)**

- Ensure the WHMP is consistent with the current CFR Title 14 FAR part 139.337.
- Implement the Wildlife Hazard Management Plan at SEA.
- Train, supervise, coordinate, and monitor activities of the Airport Duty Managers, Airport Operations Specialists, and contractors as outlined in the WHMP, especially with regard to the safe use of firearms and pyrotechnics.
- Chair the Wildlife Hazard Working Group meetings for SEA.
- Disseminate information and assignments through the Wildlife Hazard Working Group.
- Coordinate and approve wildlife-related changes to the SEA Landscape Standards and Rules and Regulations.
- Alleviate hazardous wildlife attractants deemed an imminent hazard.
- Coordinate the issuance of Notices to Airmen (NOTAM) through the Airport Duty Manager pertaining to wildlife hazards.
- Provide public relations support for the wildlife program through POS Public Affairs and Media Relations.
- Monitor facilities and tenant concerns for wildlife problems (24-hour response).
- Keep a log of all wildlife strikes and control actions and forward reports to FAA as necessary. Control actions will be documented and available for review on request.
- Make electronic wildlife strike report readily available to airfield operations and airlines for submission to the FAA National Wildlife Strike Database.
- Make electronic or hard-copy Daily Wildlife Report forms available to the ADMs and AOSs for submission to the POS Wildlife Biologist.
- Coordinate with airport environmental staff of all modifications planned in wetlands, streams, stormwater facilities, or on-site mitigation areas.
- Work with airport maintenance to alter wildlife habitat as needed to minimize hazardous wildlife attractants on POS property.
- Review plans involving land use change to avoid inadvertently attracting wildlife to the area.
- Obtain and maintain permits for wildlife depredation, harassment, capture, marking and relocation from federal or state wildlife agencies to control protected birds and mammals.

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## Manager, Airport Certification

- Ensure the WHMP complies with the SEA Airport Certification Manual for SEA per CFR Title 14 FAR part 139 and other mandates, procedures, guidelines and regulations applicable for maintaining FAA Certification.
- Ensure only properly trained and badged wildlife control personnel operate on the AMA in accordance with FAA regulations. Such training includes radio communications and driving on the AOA.

## ☒ Airport Duty Manager (ADM)

- Log all known wildlife strikes on the online electronic strike report (Appendix C) and forward the forms to the POS Wildlife Biologist.
- Warn the air traffic control tower and pilots of imminent wildlife hazards.
- Insure wildlife-attracting refuse does not accumulate in fields and ditches on the airport.
- Inspect critical areas for wildlife activity and strikes and maintain a record of the action, even if no wildlife was present.
- Reduce wildlife hazards from critical areas when appropriate as outlined in Chapter 6.
- Record all wildlife activity or animals dispersed or shot on the “Daily Wildlife Report” (Appendix C) and forward the report to the POS Wildlife Biologist.
- Assist with wildlife control activities involving field rodents, rabbits, and bird abatement, and other programs.

## ☒ Airfield Operations Specialist (AOS)

- Assist ADMs with their above described duties, especially
  - Conducting runway inspections for dead or injured animals.
  - Collecting snarge (wildlife remains) from the Air Movement Area and aircraft.
  - Logging all known wildlife strikes on the FAA’s online wildlife strike report and Daily Wildlife Report (Appendix C) and forwards these forms to the Airport Duty Manager.
- Warn the air traffic control tower and pilots of imminent wildlife hazards.
- Insure wildlife-attracting refuse does not accumulate in fields and ditches on the airport.
- Inspect critical areas for wildlife activity and strikes and maintain a record of the action, even if no wildlife was present.
- Haze wildlife from critical areas when appropriate as outlined in Chapter 6.
- Record all wildlife activity or animals dispersed or shot on the “Daily Wildlife Report” (Appendix C), and report to the POS Wildlife Biologist.
- Assist with wildlife control activities involving field rodents, rabbits, and bird abatement, and other programs.

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## Airfield Maintenance

- Maintain ditches and fields to ensure that water flows (see Section 3), thereby avoiding pooling and accumulation of refuse on the airport.
- Assist with, or contract out habitat modifications addressed in the WHMP, such as vegetation maintenance along ditches, brush removal, and tree pruning. Coordination with airport environmental staff is required before work in wetlands or on-site mitigation areas is completed.
- Install and maintain netting, wire grids, or other exclusion devices, over ponds, ditches, and other water areas as determined necessary by the Wildlife Coordinator and after coordination with airport environmental staff.
- Maintain the perimeter fence to exclude mammals such as deer, bear, and coyotes.
- Pick up all trash and debris on the airfield.
- Minimize pooling formed by rain on tarmac and infield areas; these areas will be graded if necessary.
- Inform the POS Wildlife Biologist of rodents and other wildlife found in and around buildings.
- Rodent-proof buildings, dumpsters, and other refuse containers to the extent feasible.

## Aviation Environmental, Engineering, Facilities and Infrastructure, Planning, and Project Management

- Involve the POS Wildlife Biologist with project proposals that could potentially result in hazardous wildlife attractants within 5 miles of SEA.
- Involve the POS Wildlife Biologist with land use planning and mitigation efforts, especially SEPA documents.
- Assist the POS Wildlife Biologist in evaluating permit requirements and agency coordination for activities in wetlands, streams, or on mitigation sites.

## POS Police

- Provide assistance to the Wildlife Hazard Management Program by acting as the central contact point for the ADMs and other police agencies having jurisdiction near SEA for times when pyrotechnics and live rounds are in use.
- Discuss these activities in general terms with those calling the POS PD and voicing concerns.



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## Community Relations and Public Affairs

- Assist the POS Wildlife Biologist with community contacts, especially in gaining community awareness of airport wildlife hazards and notification of their projects that are potential wildlife attractants.

### 2.3.2 - Federal Aviation Administration

- Provide information related to aircraft-wildlife strikes and other wildlife incidents to the Airport Duty Manager (206) 433-4682.
- Assist SEA in reviewing proposed land use changes, construction plans, and mitigation projects for potential wildlife hazards to aircraft.
- Review changes to and approve the WHMP.



### 2.3.3 - ☒ USDA Wildlife Services

- Conduct frequent physical inspections of areas critical to wildlife hazard management.
- Inform and advise the POS Wildlife Biologist of wildlife management activities, habitat modification needs, and imminent wildlife hazards that require the issuance of an ATIS or runway closure.
- Assist SEA personnel in monitoring the airport environment for wildlife hazards, taking corrective action, if necessary, and record and submit all findings to the POS Wildlife Biologist.
- Assist with training airport personnel in the safe handling and proper use of wildlife dispersal methods and equipment
- Coordinate wildlife control activities with state and federal wildlife agencies and municipal law enforcement.
- Assist SEA in reviewing proposed land use changes, construction plans, and mitigation projects for potential wildlife hazards to aircraft.
- Provide operational assistance to SEA to control European starlings, pigeons, geese, or other wildlife deemed hazardous by SEA and WS.

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#### 2.3.4 - ☒ Falcon Research Group

- Assist SEA personnel in monitoring the airport environment for wildlife hazards.
- Take corrective action, if necessary, and record and submit all findings to the POS Wildlife Biologist.
- Inform and advise the POS Wildlife Biologist of wildlife management activities, habitat modification needs, and imminent wildlife hazards that require the issuance of an ATIS or runway closure.
- Assist with training airport personnel in raptor identification.



Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_

## 3.0 - HABITAT MANAGEMENT

***FAR 139.337(f)(2)***

***A list prioritizing the following actions ...and target dates for completion.***

### 3.1 - OVERVIEW

Habitat management provides the most effective long-term remedial measure for reducing wildlife hazards on, or near, airports. Habitat management includes the physical removal, exclusion, or manipulation of areas that are attractive to wildlife. The ultimate goal is to make the environment fairly uniform and unattractive to the species that are considered the greatest hazard to aviation. Habitat modifications will be monitored carefully to ensure that they reduce wildlife hazards and do not create new attractions for different wildlife. Table 2 lists a series of both habitat and non-habitat based action items/priorities, with target dates for completion.

<b>Table 2.</b> Management priorities for projects to reduce wildlife hazards at Seattle-Tacoma International Airport are listed, along with the target dates for completion and date that each project was completed. Note that some of the projects may have already been implemented or completed, but because they require a continued effort (e.g., brush removal from drainage ditches), they are listed as “ongoing”.		
<b>SEA WILDLIFE MANAGEMENT ACTIONS</b>	<b>TARGET DATE</b>	<b>DATE COMPLETED</b>
Exclude all current and potential bird perching areas (i.e. terminals, walkways, parking garage).	Ongoing	Ongoing
Move European starling roost at south end of terminal by hazing, tree removal, and thinning the tree canopy.	September 1999	September 1999 August 2001 August 2004 Ongoing
Plant scrub/shrub habitat on Vacca Farm, golf course fairway, and Des Moines Creek Regional Detention Facility.	Fall 2001	2000, 2005, 2006 and 2007
Remove Scotch broom/ blackberry shrubs within 200 feet of all aircraft movement areas	Ongoing	Ongoing
Clear and maintain ditches throughout airfield to enhance drainage	Ongoing	Ongoing
Evaluate potential wildlife hazards associated with new construction.	Ongoing	Ongoing
Remove fruit and nut bearing trees on SEA property (N. runway protection).	Summer 2001	Summer 2001
Net, grade, or fill tire ruts on infield caused by construction equipment.	Every Fall	Ongoing
Finalize coyote-deterrent fencing around entire AOA perimeter	December 2008	Ongoing
Maintain updated Migratory Bird Depredation Permit, Bald Eagle Harassment Permit, WA Scientific Collection Permit, USFWS Banding Permits and others as appropriate.	Ongoing	Ongoing
Stock and maintain wildlife control supplies.	Ongoing	Ongoing
Develop a computerized record keeping system for wildlife strikes and hazing efforts	Summer 2001	Spring 2001 Spring 2003
Maintain a zero-tolerance wildlife control program on airfield for hazardous species and events	Ongoing	Ongoing

Original Date: \_\_\_\_\_

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**Table 2.** Management priorities for projects to reduce wildlife hazards at Seattle-Tacoma International Airport are listed, along with the target dates for completion and date that each project was completed. Note that some of the projects may have already been implemented or completed, but because they require a continued effort (e.g., brush removal from drainage ditches), they are listed as “ongoing”.

SEA WILDLIFE MANAGEMENT ACTIONS	TARGET DATE	DATE COMPLETED
<u>Population Management</u> - Maintain European starling and rock pigeon trapping program	Ongoing	Ongoing
Develop and maintain a Wildlife Hazard Management Plan	May 2008	
Evaluate potential wildlife hazards associated with new construction.	Ongoing Wildlife Hazard Assessment	Ongoing Wildlife Hazard Assessment
Train employees in the safe and effective application wildlife dispersal and incident reporting procedures.	Fall 1999	Annually
<u>Land Use Changes</u> - Develop a landscaping standards and landscaping zones that consider wildlife hazards and those measures to decrease the attractiveness of the wildlife Critical Area.	Summer 2004	Summer 2004
Monitor existing flooding at Miller Creek/Lora Lake Wetland Mitigation Sites and report findings at next WHWG	May 2008	

## Coyote-Deterrent Fence



Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_



## 3.2 - ATTRACTANTS

### 3.2.1 - General Zone and Critical Zone

**General Zone** - The *General Zone* for SEA Airport is defined as the area within a 5-mile radius of the runway centerline. Wildlife attractants in this area could potentially impact air traffic safety operating out of SEA, particularly those attractants that lie within the approach and departure patterns. The objective of this plan is to actively reduce attractive wildlife habitat on property under the control of the Port of Seattle, while working cooperatively with adjacent property owners to discourage land-use practices that might increase wildlife hazards

**Critical Zone** - The area within a 10,000-foot radius of the runway centerline is delineated as the *Critical Zone* (see aerial in Appendix A). Control efforts will be primarily concentrated within this area because within 10,000 feet from the AOA fence-line is the area where arriving and departing aircraft are typically operating at or below 1000 feet AGL (above ground level); an altitude that also corresponds with the most bird activity. Beyond 2 miles to the west is Puget Sound; an area with substantial wildlife abundance, especially during migration. Many of these seabirds that are so common to this marine ecosystem, however, rarely venture overland near SEA, as is substantiated by their virtual absence in both the observational and SEA wildlife strike records (e.g., Table 1).

Over 75% of all civil bird-aircraft strikes occur within 10,000 feet of the airfield from which they depart or arrive. Some of the most prominent attractants on Port of Seattle property include the industrial wastewater lagoons, Tyee golf course, Des Moines Creek Regional Detention Facility (NW Ponds), Lora Lake, and Lake Reba. Off-site attractants include Angle Lake and Bow Lakes.



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### 3.2.2 - Edge Removal

Edges are the places where different habitats meet and are often most attractive to wildlife because the animal's biological needs can be met in a relatively small area. Much of the "edge" at SEA consists of a forest-grassland transition that has been pushed back at least 400 feet from the runway by SEA maintenance, this policy will continue. Monotypic plant communities on and around the airfield should be encouraged.



Scotch Broom and blackberries are discouraged from growing within 200 feet of the AMA to reduce cover for small mammals and other prey.



Even at speeds lower than the typical aircraft, a bird can cause costly damage to most any quickly moving object.

Original Date: \_\_\_\_\_

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### 3.2.3 - Airport Building Projects

The POS Wildlife Biologist should participate in the initial phases of all airport building projects to avoid and inadvertent increase in wildlife hazards resulting from architectural or landscape changes. This participation has been especially important during construction of the third runway, when the SEA airfield environment was extremely dynamic. Likewise, additional effort will be required to ensure that new projects and construction activities are also designed in a manner that minimizes wildlife attractants. The FAA's Seattle Airports District Office (ADO) reviews proposed construction activities for potential wildlife attractions when the FAA Form 7460-1 application is submitted. The FAA may also solicit input from Wildlife Services.



### 3.2.4 - Non-airport Land-use Projects

Whenever possible, the POS Wildlife Biologist will actively participate in land-use decisions and landscape changes to avoid inadvertent wildlife hazards to aircraft within the General Zone and Critical Zone. This participation will be done by working with the local planning authorities with the intent of reviewing proposed land-use changes. If projects cannot be reasonably modified before construction to mitigate wildlife hazards, the project should be monitored following construction for hazardous wildlife activity so as to offer recommendations on how these hazards might be reduced.

The FAA's Seattle Airports District Office and Safety and Standards Branch of the FAA Northwest Mountain Region will provide technical guidance to SEA in addressing land-use compatibility issues. If SEA or the FAA requests assistance from Wildlife Services per the Memorandum of Understanding between FAA and Wildlife Services, then Wildlife Services will provide technical and/or operational assistance in addressing issues or concerns associated with the proposed project or land-use change. Proposed projects that will likely increase bird numbers within flight zones will adamantly be discouraged, or mitigated to a safe level. Incompatible land uses may include developments such as water reservoirs, parks with artificial ponds, wetlands, and certain wildlife refuges/sanctuaries where design modifications such as netting, dense vegetation and liners, for example, cannot be employed to mitigate the attractiveness of the site.



Original Date: \_\_\_\_\_

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### 3.3 - WATER MANAGEMENT

#### 3.3.1 - Overview

SEA has small lakes, stormwater detention facilities, and wetlands on and near airport property. In addition, small drainage ditches can be found on the airfield that attracts a moderate number of birds and mammals throughout the year, especially during winter when migratory waterfowl pass through the area. Open water on SEA property will be netted, covered, and/or planted wherever possible and monitored closely to ensure hazardous species do not acclimate to these sites. Temporary open water areas will be monitored by the POS Wildlife Biologist and/or Wildlife Services and covered or removed if deemed necessary<sup>1</sup>. Water sources outside of SEA property, but within the critical area of SEA, will be monitored, and SEA will work with local agencies and landowners to help deter hazardous wildlife.



**Tyee Golf Course following a 1.2" rain event (October 20, 2000). In 2005, NW Ponds was modified into the Des Moines Creek Regional Detention Facility to reduce flooding, while storing more water, and at the same time help reduce waterfowl numbers with dense vegetation and bird wire.**

#### 3.3.2 - Wetlands

Several small streams and wetlands naturally occur on and near the airport and are attractive to wildlife. Wetland mitigation for impacts resulting from the Master Plan Update construction projects, including mitigation at Des Moines Creek, the former Vacca Farms, Walker Creek, and Miller Creek have been implemented according to the Natural Resources Mitigation Plan and pertinent Section 404 and Section 401 (Appendix F) permit conditions. Modification of vegetation in mitigation areas could be subject to agency review as discussed in Section 4.

Mitigation for other future projects, if required, will occur as far away from the airfield as possible, unless it can be demonstrated with reasonable certainty that the mitigation would not likely increase wildlife hazards and will comply with criteria described in FAA Advisory Circular 150/5200-33B. The golf course fairway adjacent to the Des Moines Creek Regional Detention Facility (NW Ponds) site, Industrial Wastewater Lagoon No. 3, and the runways will be planted with a shrub/scrub plant association to deter waterfowl. Any future wetland mitigation plans will also need to be reviewed by the POS Wildlife Biologist.

<sup>1</sup> Temporary open water may be covered with nets or obscured by vegetation. For example, nylon mesh nets, suspended one to several feet above the water's surface have been installed over several ponds associated with stormwater treatment facilities. The proposed mitigation on the golf course and Vacca farm will use vegetation to obscure floodwaters from birds.

Original Date: \_\_\_\_\_

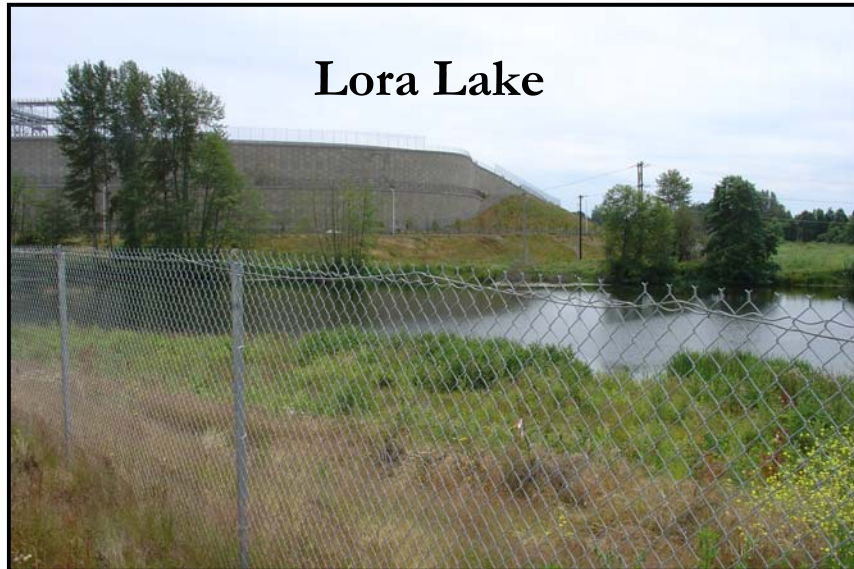
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### 3.3.3 - Lakes

Lora Lake, abutting the Vacca Farm mitigation site, lies directly in line with the new runway 34R/16L. SEA will closely monitor wildlife activity at Lora Lake and its shrub-scrub floodplain as part of the Vacca mitigation project (see Chapter 9). When wetland mitigation plantings have matured to a stature to meet wetland regulatory compliance specifications, the vegetation will also be expected to exclude waterfowl from the area at this time. If necessary, the POS Wildlife Biologist should take the appropriate steps to alleviate habitat responsible for creating additional wildlife hazards.



Lake Reba will also be monitored for hazardous wildlife activity because of its proximity relative to Lora Lake and the runways. Lake Reba is a highly productive open-water wetland area that can and does harbor many species of waterfowl. Regular site visits and wildlife control activities should continue at this site. In 2006, this water feature was designated waters of the state, meaning it is now considered a jurisdictional and protected wetland area

Bow Lake and Angle Lake will be monitored because both are situated within SEA's critical area. Wildlife movement between these lakes and SEA has been observed. If wildlife associated with any of these lakes becomes noticeably hazardous to airport operations, SEA's POS Wildlife Biologist will work cooperatively with the adjacent property owners to deter and/or remove the problem animals that threaten aircraft safety.



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### 3.3.4 - Stormwater Detention Ponds

The management of airport stormwater detention ponds has been a topic of considerable discussion due to their ability to attract waterfowl and to contribute to increased nesting and waterfowl populations. At SEA, a combination of environmental regulations, including those needed to protect spawning habitat for threatened and endangered fishes, requires substantial volumes of runoff to be detained on site. Consequently, nearly 20 detention ponds will be constructed to support the SEA Master Plan Update Projects. Because of these concerns, all temporary ponds are netted to discourage the use of waterfowl, herons and other hazardous wildlife during construction. During the 2004 WHWG meeting it was stated that the POS had already taken all reasonable steps to minimize the retention times, dead storage, and pond surface areas of these facilities. Monitoring results from 2000 to 2006 indicate netting is extremely effective during the first several years, but as vegetation grows and eventually through the net, the netting often becomes damaged and in need of frequent repairs. This monitoring, in conjunction with an extensive evaluation of all known wildlife hazard mitigation techniques, enabled SEA to develop a Wildlife-Stormwater BMP where a combination of liners and surface netting is employed. This BMP was developed during a multi-year decision matrix process, where the following mitigation options, either separately or in combination with one another, were evaluated:

- Liners (to prevent vegetation growth, food resources, and edge effect)
- Netting
- Floating balls
- Floating covers
- Geodesic domes
- Underground Vaults

As agreed with the USDA and the FAA, the POS will continue to evaluate the long-term effectiveness of lined and netted ponds for abating hazardous wildlife hazards using avian radar or other methods. Automated means of collecting data seem most prudent for this continued evaluation as the number of variables in such a study are high while the frequency of hazardous bird observations is expected to be extremely low. This combination of factors makes traditional surveys extremely costly and unlikely to succeed in determining the effectiveness of this BMP.



The avian radar, now being tested at SEA, may be useful in validating the POS' Hazardous Wildlife Mitigation BMP, a method of using liners and netting on the airport's stormwater detention ponds.

Original Date: \_\_\_\_\_

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### 3.3.5 - Temporary Pools and Ditches

During the wetter winter and spring months, small depressions (tire ruts) created by vehicles operating within the infield areas fill up with water for short periods of time and can attract dabbling ducks and shorebirds. This situation may become particularly problematic during periods of heavy construction activity associated with the new runway. SEA should discourage driving on the infield during periods of high precipitation to avoid ruts in the soil. Where ruts are found, POS Maintenance should fill and/or grade the damaged area. In areas where there are larger pools, the land should be filled or graded such that water consistently drains into ditches. Ditches<sup>2</sup> should be appropriately sloped so that water does not pool and leaves the airfield in a reasonably short amount of time. Ditches that pool and attract hazardous wildlife may be covered, in whole or part, using a wire grid system or other barrier (e.g., polyester netting).



Because site conditions, wetland regulations, and jurisdictional determinations change over time, the regulatory status and distinctions between ditches and Waters of the U.S. must be considered on a case-by-case basis. Wetlands and other “Waters of the U.S.” are identified on the wetland delineation maps completed for the Master Plan Update projects (Appendix E). On-site conditions must be evaluated for all areas prior to management actions that may require permit approval.

Temporary open water that ponds in non-wetland locations and outside of mitigation sites may be removed by improving drainage (through excavation or maintenance of ditches, trenches, French drains etc.) or filling of shallow depressions. In Waters of the U.S., the above activities require careful review by Port Environmental staff to determine regulatory requirements as they could be subject to review and approval by federal and/or state agencies.



## 3.4 - VEGETATION MANAGEMENT

### 3.4.1 - Overview

SEA contains diverse vegetation types, some of which are highly attractive to wildlife. The most effective approach to reducing this attraction in the critical zone is to remove all unnecessary trees, shrubs, weeds and plants, and establish non-seeding or small-seeded grass, especially within 200 feet of the runway. The POS Wildlife Biologist should review all plantings on SEA property and exclude those

<sup>2</sup> Some ditches adjacent to runways, roads, and taxiways are designed as biofiltration swales to treat stormwater runoff. Modification of these ditches must be made using accepted engineering designs for water quality treatment, or alternative treatment measures.



species that produce edible fruits, nuts or berries. Recommended landscaping zones have now been adopted into the POS Landscape Standards (Appendix B).

### 3.4.2 - Grass Management

Other than paved areas, grass will be the primary cover inside the perimeter security fence. FAA CERTALERT No. 98-05 advises that “airport operators should ensure that grass species and other varieties of plants attractive to hazardous wildlife are not used on the airport”. In addition, grasses that produce large seeds and are known to be attractive to wildlife will be avoided when planting new areas.

#### 3.4.2.1 - Grass Type

The type of grass used within the perimeter fence and between the runways should produce small or no seeds, but still be able to generate new growth or re-seed itself to provide a thick, monotypic stand and prevent erosion. The selected ground cover should withstand drought, flooding, and other normal climatic conditions, and be somewhat unpalatable to grazers such as geese and wild ducks. The grasses should also harbor relatively few insects and rodents that may attract hawks, owls, European starlings, and other hazardous wildlife species. Several varieties of tall fescue (*Festuca arundinacea*), if allowed to grow to a height of 8-14 inches,



**Even tall fescue stands need to be cut regularly to prevent excessive seed production and the creation of escape cover.**

have been found to be unattractive to Canada geese because of a fungus harbored by the plant, and the fescue will generally preclude other more attractive grass species from invading the airfield.

In 2003, SEA began experimenting with a new grass seed mix which uses several grasses harboring the fungus (endophyte) found to be important for creating the taste-aversion response in waterfowl. This mix, comprised of Perennial Rye (60%), Chewings Fescue (25%) and Creeping Fescue (15%), has recently been approved as the POS hydroseed specification because this approximate mix was found to grow quickly and have beneficial soil stabilization properties that are in compliance with the Washington Department of Ecology’s erosion control standards and objectives.

Original Date: \_\_\_\_\_

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### 3.4.2.2 - Grass Height

With Canada geese populations being successfully controlled near SEA through the efforts of the Seattle Waterfowl Committee (through which the Port of Seattle and the USDA Wildlife Services are contributing members), grasshoppers are currently more of a concern as a wildlife attractant than are geese. Consequently, grass height should be kept shorter, between 6-10 inches to reduce grasshopper abundance, an attractant of especially crows and some raptor species. Around runway and taxiway marker lights, the grass will be cut to 3 inches for purposes of visibility. Grass height will be maintained throughout the year, with the first mowing activities beginning when the infield is firm enough to allow equipment access and the grass is sufficiently long to merit cutting.



Pheasant under glass...

### 3.4.2.3 - Mowing

When possible, grass will be mowed at night when birds are the most inactive and air traffic is reduced. Mowing is quite attractive to several species of birds and mammals because it exposes food sources such as rodents, insects, and seeds. If cutting is being conducted during the day and birds are attracted to activity, the mowing should stop until the birds have been successfully hazed from the area. Mowing activities will be coordinated with the wildlife dispersal team in coordination with the Airport Duty Manager.

Original Date: \_\_\_\_\_

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### 3.4.3 - Streamside Vegetation

Herbaceous vegetation growing on the edge of a stream or other wetland may provide preferred habitat for species considered most hazardous to aircraft. The vegetation that grows alongside ditches<sup>3</sup> on SEA property may be removed or maintained so that habitat is not provided for waterfowl, herons, blackbirds, rabbits, and other wildlife that could present a direct or indirect hazard to aviation. Rock (e.g., quarry spalls, rip-rap), and in some instances, trees, shrubs or grass, can be used to replace undesirable plants, slow erosion, and conceal water from wildlife. Each situation will need to be examined on a case-by-case basis to avoid worsening the hazards. SEA should identify where existing streamside conditions attract wildlife and develop an appropriate plan to reduce the hazard. Modification of streamside vegetation in mitigation areas should be consistent with mitigation plans and Section 404 and 401 permit conditions (see Appendix F). Modification of streamside vegetation outside of mitigation areas may be subject to other environmental regulations (see Section 4.11).



<sup>3</sup> Some ditches may be jurisdictional wetlands under Section 404 of the Clean Water Act and require review by the Army Corps of Engineers prior to modification. Placement of riprap along streams must be consistent with environmental regulations, the Natural Resource Management Plan for the Master Plan Update (including associated Section 404 and 401 conditions (see Appendix I and J, respectively).

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

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### 3.4.4 - Ornamental Landscaping

Landscaping at the airport can affect tourism, business, and the overall impression of the SEA vicinity to visitors; therefore, landscaping needs to be aesthetically pleasing. It must, however, coincide with the airport's greater responsibility of air safety. In some instances, trees and bushes offer hunting perches, roosting and loafing sites, nesting cover, and food for birds and other wildlife should be removed. Ornamental trees and bushes used to enhance airport aesthetics will be kept to a minimum.

SEA has a list of approved plant species which is available online at the POS' Wildlife Management website. This list, available to all contractors and the public, can be found at [www.portseattle.org](http://www.portseattle.org). Species of particular concern are fruit, nut and berry producers because they can attract wildlife and in some instances provide escape cover. SEA maintenance will continue to monitor and maintain the blackberry and scotch broom that grows within 200 feet of the runways. SEA should continue to monitor ornamental trees to prevent communal roosting by European starlings and crows. Such trees should be thinned or removed if necessary.



### 3.4.5 - Structure Management

#### 3.4.5.1 - Overview

Structures provide cover and hunting perches for wildlife. If wildlife use is considered when a building is being designed, costly control measures can frequently be avoided. Buildings should not provide nesting, perching, or roosting sites for birds and should inhibit access by mammals such as rodents and cats.

#### 3.4.6 - Airfield Structures

Airfield structures such as runway lights, ramp and taxiway signs, ILS towers, and light poles are used as hunting and loafing perches for birds such as hawks, European starlings, and gulls. Lights attract insects at night, and in turn, bats and nighthawks. Structures found to routinely attract birds in a hazardous manner may be fitted with wire coils or porcupine wire (e.g., Nixalite). Gulls are particularly attracted to green grass roofs for nesting and should be discouraged for all buildings at and near SEA.



Porcupine wire used to deter raptors from perching near runways (compliments of PDX).

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_

### 3.4.7 - Abandoned Structures

Structures not pertinent to air operations and no longer in use should be removed, including abandoned houses, sheds, machinery, and light poles. Such structures are attractive to rodents, small birds and rabbits and, in turn, attract hawks, owls and other predators that can become a significant air hazard. Structures used for crash-fire training are considered to be pertinent to air operations and are generally compatible with safe air operations.



Removing the SEA burn pit eliminated the standing water and wildlife use.

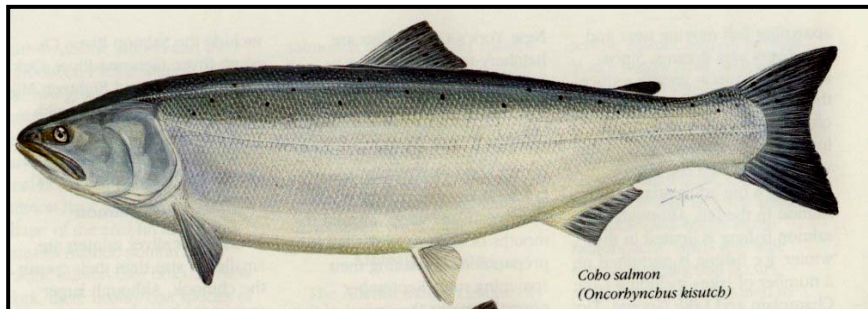
## 3.5 - FOOD/PREY-BASE MANAGEMENT

### 3.5.1 - Overview

Fish, rodents, rabbits, insects, earthworms, and other invertebrates are highly attractive to many species of birds and mammals and should be controlled where feasible. Handouts, trash, and scattered debris also provide food for wildlife. The modification or management of a wide variety of habitats such as wildlife-attracting vegetation and removal of abandoned structures will reduce populations of potentially hazardous wildlife by limiting shelter, food, and prey availability.

### 3.5.2 - Fish

Several fish species occur at SEA and attract some avian species to the area that are commonly associated with bird strikes. One species, the Great-blue Heron, frequents the wetland and riparian habitats adjacent to the airfield. It is important that



future activities at SEA preserve and enhance riparian and wetland functions associated with water quality. It is also important to avoid unnecessary enhancement of fish habitat that will increase the attractiveness of this high-energy food source to wildlife. Access to fish by avian predators might be reduced somewhat by decreasing the amount of open water (foraging) area. Problematic wildlife might be effectively excluded by increasing the amount of vegetative cover over open water. Alternatively, exclusion may require the use of a more costly and maintenance-intensive approach by netting these open-water reaches. The carcasses of spawned-out salmon should always be viewed as a major wildlife attractant even if some species of wildlife can be physically excluded from this resource with the creative employment of vegetation and netting. High populations of mammalian fish predators, such as river otters should not be discouraged on and near POS property.

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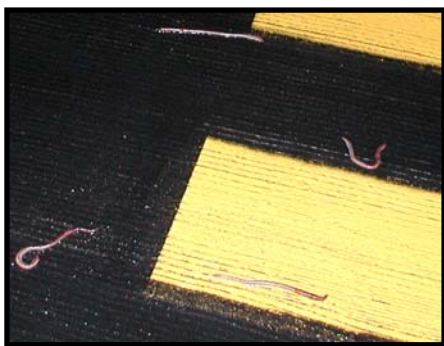
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### 3.5.3 - Rodents

Mice and voles at SEA appear to be the primary attractants of hawks and coyotes, but will occasionally attract herons and other predators. Historically, rodent populations at SEA have been relatively low, but SEA will continue to monitor populations and will conduct a control program if rodent abundance increases to a level where wildlife is attracted.



### 3.5.4 - Insects and Other Invertebrates



Insects and other invertebrates (e.g., earthworms (left), spiders, etc.) may attract many species of wildlife at SEA, particularly gulls (below) European starlings, crows (below). Insect populations will be monitored periodically by SEA to determine if they are present in sufficient numbers to attract wildlife. If control is deemed necessary, the Washington State University Cooperative Extension agent (see Chapter 10) can help select the best pesticide or control method. Habitat management will keep much of the prey population in check, but the airport will continue to monitor these populations for outbreaks.

### 3.5.5 - Trash, Debris, and Handouts

Trash and debris are often responsible for attracting species such as gulls and crows. SEA maintenance will continue to conduct trash and FOD (foreign object debris/damage) collection sweeps on the airfield, especially after high winds. The public or airport employees should not be allowed to feed birds or mammals around the airport. Of particular concern is the feeding of ducks and geese at the golf course near the south end of the airport. When people are observed feeding birds, SEA will discuss with them the problems caused by feeding wildlife, and if necessary, signs will be posted to educate the general public.



Original Date: \_\_\_\_\_

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SEATTLE PARKS  
AND RECREATION

# FOUR REASONS NOT TO FEED DUCKS AND GEESE



Many people like to feed wild ducks and geese but what seems like kindness can be very harmful. Here are several good reasons not to feed them:

- ## 1. HUMAN FOOD IS NOT GOOD FOR WATERFOWL

Human food is junk food for ducks and geese. It lacks minerals needed to make strong, healthy waterfowl. Overfed, undernourished waterfowl suffer from more illness and disease.
- ## 2. PARASITES IN WATERFOWL CAUSE SWIMMERS ITCH

Tiny parasites which live inside waterfowl release their eggs into the water. The larvae then burrow into water snails and grow into a larger form which can then dig into a swimmer. When the parasites die under the skin, swimmers may get an itchy allergic rash. Too many waterfowl often mean swimmers itch.



- ## 3. FEEDING WATERFOWL CAN INTERFERE WITH NATURE

Feeding waterfowl can artificially increase their population. Feeding also encourages waterfowl to "over-winter" in lakes and ponds--interrupting their natural migration patterns. When they stay through the winter the result can be an unhealthy build-up of duck and goose poop.
- ## 4. INCREASED NUTRIENTS CAUSE ALGAE AND WEED GROWTH

Waterfowl waste pollutes both water and surrounding beaches. Too many nutrients from these droppings fertilize murky green algae blooms and excessive aquatic weed growth crowding out other plants and animals. Lakes and ponds choked with aquatic weeds make it difficult to swim and fish.

**OTHER WAYS TO ENJOY WILD LIFE**

If you enjoy feeding wild geese, ducks, birds and other animals, there are several petting zoos and parks throughout King County. The Audubon Society offers many programs for bird enthusiasts. For more information about urban wildlife management, call: Urban Wildlife Program, Washington State Department of Fish and Wildlife ..... 425-775-1311

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_

## 4.0 - LAWS AND REGULATIONS

### *FAR 139.337(f)(3)*

*Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits.*

### 4.1 - OVERVIEW

Federal, state and local governments administer laws and regulations that protect wildlife and their habitat. A number of laws affect wildlife control at airports and SEA. Wildlife control personnel should be educated about these regulations to ensure compliance. In general, harassing and/or taking most types of wildlife is regulated through a permit process overseen by federal or state agencies. Permits are necessary for a successful control program and will be obtained on a regular basis, or as required, by the POS Wildlife Biologist. Because permits are continually updated, sometimes as frequently as every 90-days in the case for permits required to harass bald eagles, all current permits will be made available on request through the SEA Wildlife Coordinator (POS Wildlife Biologist).



### 4.2 - FAA ADVISORY CIRCULARS AND CERTALERTS

The FAA is the federal agency responsible for developing and enforcing air transportation safety regulations. Many of these regulations are codified in the Federal Aviation Regulations (FARs). The FAA also publishes a series of guidelines for airport operators to follow called Advisory Circulars (ACs). Advisory Circulars in the 150 series deal with airport safety issues, including wildlife hazards. In addition to FARs and ACs, the FAA periodically issues CERTALERTS for internal distribution and to provide recommendations on specific issues for inspectors and airport personnel. All of the above-mentioned regulations, Advisory Circulars, and CERTALERTS are frequently changed or updated, and their current status should be verified on a regular basis. This may be accomplished visiting the FAA website: [www.faa.gov](http://www.faa.gov).

### 4.3 - STATE WILDLIFE REGULATIONS



WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

**Wildlife Science**

Several Washington State government agencies have regulations that affect wildlife control at airports. Pertinent regulations can be found in the Washington Administrative Code (WAC) and the Revised Code of Washington (RCW). King County and municipality regulations can also affect SEA's wildlife management efforts. State wildlife laws involving resident birds, mammals, reptiles, and amphibians, as well as state threatened and endangered species generally are administered by Washington Department of Fish and Wildlife (WDFW).

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#### 4.4 - FEDERAL WILDLIFE REGULATIONS

Several federal regulations, including the *Migratory Bird Treaty Act*, the *Lacey Act*, the *Endangered Species Act*, *Eagle Protection Act*, the *Clean Water Act*, the *National Environmental Policy Act*, and the *Federal Insecticide, Fungicide, and Rodenticide Act* regulate various aspects of SEA's wildlife management activities. Additional regulations that may affect wildlife control activities at SEA are found in the Code of Federal Regulations (CFR), and several federal agencies may be responsible for their implementation. Federal wildlife laws are typically administered by the U.S. Fish and Wildlife Service (USFWS) and involve primarily migratory birds and threatened and endangered species.

#### 4.5 - WILDLIFE CATEGORIES

CFR Title 50, RCW Chapter 77, and WAC Chapter 232-12 define the categories of wildlife and regulations for them. For the purposes of this document, feral and free roaming dogs, cats and other domestic animals are considered "wildlife" because of the hazards they may pose to aircraft, but they are mostly regulated under other municipal laws. Wildlife categories (Table 3) include migratory and resident, game and non-game, and threatened and endangered species. Wildlife control personnel should know the category for the species that they intend to control, so that they can determine the relevant laws and necessary permits.



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**Table 3.** Wildlife Categories in King County, and permits necessary for lethal control as required by federal and state wildlife agencies. The table also shows whether SEA has current federal or state permits for each category. It should be noted that RCW 77.36.030 (trapping or killing of wildlife causing damage - emergency situations) provides for the trapping or killing of wildlife (with exception of threatened, endangered, and federally protected species) by property owners without state permits, if the wildlife are damaging property or posing a threat to human life. Under the provisions of RCW 77.15.194 and WAC 232-12-142, certain body-gripping traps (padded leghold, underwater conibear, and foot snare) can be employed provided an application for a 30-day permit to trap problem animals has been submitted to WDFW Enforcement (see Chapter 10).

Category	Species	State Permit Required <sup>1</sup>	State Permit Obtained	Federal Permit Required	Federal Permit Obtained
<b>Resident Game Birds</b>	Quail, ring-necked pheasant, grouse, partridge, and turkey	Yes	Not Necessary	No	N/A
<b>Resident Nongame Birds</b>	European starlings, house sparrows	No	N/A	No	N/A
<b>Migratory Game Birds</b>	Ducks, geese, coots, gallinules, snipe, and mourning doves	No	N/A	Yes	Yes
<b>Migratory Nongame Birds</b>	All species except game birds, resident nongame birds, and domestic and exotic birds	No	N/A	Yes	Yes
<b>Raptors (Trap and Relocate)</b>	All species except bald eagles. Relocations are restricted to sites within Washington State.	Yes	Yes	Yes	Yes
<b>Depredation Order Birds<sup>2</sup></b>	Crows, magpies, blackbirds, and cowbirds	No	N/A	No	N/A
<b>Domestic Birds</b>	Rock pigeons and domestic poultry	No	N/A	No	N/A
<b>Game Mammals</b>	Mule deer, white and black-tailed deer, elk, white and black-tailed jackrabbits, other rabbits	Yes	No	No	N/A
<b>Furbearers</b>	Mink, river otter, fox, raccoon, beaver, badger, muskrat	Yes	No	No	N/A
<b>Nongame Mammals</b>	All species of mammals, including coyotes, except game, furbearers, domestic mammals, and fully protected wildlife.	No	N/A	No	N/A
<b>Feral Domestic Mammals</b>	Dogs, cats, livestock	No - Call local animal control	N/A	No	N/A
<b>Reptiles And Amphibians</b>	All reptiles and amphibians except those listed as threatened or endangered.	Yes	No	No	N/A
<b>Fully Protected Wildlife</b>	Threatened and Endangered species.	Yes	No	Yes	No
<b>Bald Eagles</b>	To harass bald eagles	No	No	Yes	Yes

<sup>1</sup> Control actions requiring a state permit should be coordinated through the Regional Biologist, Washington Department of Fish and Wildlife.

<sup>2</sup> May be taken without permits “when concentrated in such numbers and manner as to constitute a health hazard or other nuisance” (50 CFR §21.43).

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## 4.6 - GENERAL REGULATIONS FOR WILDLIFE CONTROL

Several regulations and permits apply to wildlife management activities at airports in King County. Many of these regulations relate to safety, methods, and special considerations or restrictions that are usually specified on the depredation permits issued by the responsible agency.

## 4.7 - BIRDS

### 4.7.1 - Resident Nongame Birds



European starlings, rock pigeons, and house sparrows are non-game birds that are classified as non-migratory and no permit is required to take them. All other non-game birds in King County are classified as migratory. A USFWS depredation permit allows control of migratory non-game birds, provided that the species are not listed as federal or state threatened or endangered and are listed on the depredation permit.



### 4.7.2 - Feral Birds



Feral pigeons (rock pigeons) are typically the only species of concern in this category. State and federal laws do not regulate this species and no permit is required to take them. Domestic waterfowl may become a problem if they are abandoned on airport property. Only wildlife personnel trained to distinguish the differences between domestic and wild waterfowl should be allowed to take these species. If other species of feral poultry or exotic birds are observed at SEA, the POS Wildlife Biologist should be contacted for assistance with control methods.

### 4.7.3 - Migratory Birds

Migratory birds are regulated under federal law by USFWS. These regulations permit hazing of migratory birds when the birds are damaging property, but a permit is required for lethal take. Separate permits for lethal take and harassment are necessary for eagles, and threatened and endangered species. Although states can impose more restrictive regulation than federal law on migratory birds, Washington currently does not require additional permits for migratory birds that are already regulated under federal law.



One of several merlins trapped and banded at SEA and relocated to northwestern Washington State.

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#### 4.7.3.1 - Migratory Bird Depredation Permit for SEA (CFR 50, Part 13)

A depredation permit to take federally protected migratory birds can be obtained by completing a Federal Fish and Wildlife License/Permit Application and submitting it to the U.S. Fish and Wildlife Service, Permits - Law Enforcement Division, 911 NE 11th Ave., Portland, OR 97232-4181. The USFWS may also require that a Migratory Bird Damage Project Report completed by Wildlife Services accompany the permit application. SEA has a current federal permit to take all migratory birds except eagles and threatened or endangered species. Washington Department of Fish and Wildlife allows the take of these species under the federal permit without obtaining an additional state permit. Migratory birds that occur in King County include all birds except house sparrows, European starlings, feral pigeons (Rock Pigeon), pheasant, and domestic ducks, geese and other exotic birds. The POS Wildlife Biologist will be responsible for the required annual renewal of the depredation permit, and will submit a report to the USFWS within 10 days of the expiration date detailing the species and number of animals taken under the permit. Details for the permit uses are given below. Federally listed threatened and endangered migratory birds include Marbled Murrelets and Northern Spotted Owls. Peregrine Falcons were removed from both the federal and state endangered species lists during the late 1990's and early 2000, respectively, but special reporting requirements remain as a condition of the USFWS Depredation Permit. Bald Eagles were removed from the Endangered Species List in August 2007.



**Double-crested cormorant abundance is increasing in North America.**

#### 4.7.3.2 - Reporting Control Actions to USFWS

SEA should submit a report of the animals taken and hazed each calendar year to the USFWS to fulfill the requirements of this chapter. The report could be generated from a computerized database containing all control actions on SEA.



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## 4.8 - MAMMALS

### 4.8.1 - Game Mammals

Game mammals are defined primarily as those species that are hunted by man for sport, recreation, or meat. Deer have historically frequented the edge of the airfield, and may require control if they enter the airfield. Normally a state permit is required to control deer and elk, but RCW 77.36.030 provides for the trapping or killing of wildlife by properties owners, without licenses or permits, if the wildlife are damaging property or posing a threat to human life. Threatened or endangered animals are not covered under this provision, and birds protected under the Migratory Bird Treaty Act require a federal depredation permit (see Section 4.6.3 of this plan). Under the provisions of RCW 77.15.194 and WAC 232-12-142, certain body-gripping traps (padded leghold, underwater conibear, and foot snare) can be employed provided an application for a 30-day permit to trap problem animals has been submitted to WDFW Enforcement (see Chapter 10).

### Aircraft-Covote Strike

<b>Date:</b>	<b>12 June 1999</b>
<b>Aircraft:</b>	<b>Beechcraft 90</b>
<b>Airport:</b>	<b>Westchester County (NY)</b>
<b>Phase of Flight:</b>	<b>Takeoff</b>
<b>Effect on Flight:</b>	<b>Aborted takeoff</b>
<b>Damage:</b>	<b>Landing gear, nose, engines, props, wings, fuselage, lights</b>
<b>Wildlife Species:</b>	<b>Coyote</b>
<b>Comments from Report:</b>	<b>Aircraft struck a coyote at night. Nose gear was torn from aircraft causing other parts of plane to be damaged. Time out of service was 5 months, lost revenue was \$55,000 and cost of repairs was \$550,000.</b>



### 4.8.2 - Furbearers

Furbearers such as beaver will occasionally need to be removed from POS property. Although it is unlikely beaver will cause a direct hazard to aircraft, their presence frequently results in extensive flooding, and an increase in emergent wetland habitat which is attractant to detrimental species. If they ever do pose a hazard that warrants direct control, a permit is required from the Washington Department of Fish and Wildlife.

### 4.8.3 - Non-game Mammals

Several species of non-game mammals are present at SEA and may need to be controlled. Of these, coyotes present the



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greatest threat to aviation. Permits are not required to take these species when they damage or could damage property.

#### 4.9 - REPTILES & AMPHIBIANS

Non-protected reptiles and amphibians can be taken with a permit or appropriate fishing license. At their current abundance, these species do not present a major attractants to more hazardous wildlife, and as such do not necessitate inclusion in control activities.



#### 4.10 - PROTECTED WILDLIFE

##### 4.10.1 - Federal and State Threatened and Endangered Species

The Federal Endangered Species Act (Sec. 2 [16 U.S.C. 1531]) and Washington Endangered Species Act (RCW 77.12.020; WAC 232-12-297) both protects animal and plant species potentially threatened with extinction. These acts classify species as endangered or threatened. An “Endangered Species” is defined as “any species or subspecies which is in danger of extinction throughout all or a significant portion of its range.” A “Threatened Species” is defined as “any species or subspecies which is in danger of becoming an endangered species within the foreseeable future throughout or over a significant portion of its range.” Once listed, a threatened or endangered species cannot be lethally taken or harassed without a special permit. Eagles are also afforded protection under the U.S. Eagle Protection Act. In Washington, several additional species are given special protection by being listed as state threatened or endangered species.



**Providing critical habitat for a State Threatened Species, the western pond turtle is one of the possible conservation measures now being explored on the POS' Auburn Wetland Mitigation Site.**

USFWS and WDFW maintain updated lists of endangered and threatened species. A current listing of these specially protected species can be readily found by searching internet using these terms: “USFWS” or “WDFW” and “endangered species”. Habitat critical to listed species is regulated by the USFWS or WDFW and these regulations should be reviewed to determine their potential effect on SEA’s habitat modification plans to reduce wildlife hazards. Recent listings of endangered salmon species have affected the design of current construction projects at SEA. The POS Wildlife Biologist should work closely with federal, state, and local agencies to ensure that protected salmon species are not adversely affected in the future and that salmon enhancement projects do not inadvertently result in increased wildlife

hazards to aircraft. Salmon habitat improvement and/or mitigation projects will be carefully reviewed by the POS Wildlife Biologist, and if necessary, Wildlife Services and the FAA, to ensure the project does not result in hazardous wildlife attractions.

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#### 4.10.1.1 - Avoiding Impacts to Threatened and Endangered Species

SEA should review a listing of threatened, endangered, and sensitive species prior to implementing construction projects that may adversely affect these listed species, such as some species of salmon. If a significant hazard exists with a listed species that jeopardizes air safety, either the USFWS or WDFW, depending on the species involved, should be contacted for assistance. Other than the bald eagle, which was delisted in June 2007, no endangered birds have been sighted at SEA. The Marbled Murrelet and the Northern Spotted Owl are both federally listed species and may occur in King County, but have never been observed at SEA.

##### 4.10.1.1.1 Eagle Permits

On May 8, 2006 the USFWS sent email to the POS stating the POS should continue to harass eagles as needed while a determination could be made on how best to proceed with acquiring a formal permit to harass eagles. After additional discussions regarding USFWS' offices of Ecological Services, Lacey WA and the Migratory Bird Treaty division, Portland, OR it was mutually decided in late 2006 that the best approach would be to apply for the harassment permit to be issued to the POS based on the recommendation of the USDA, Wildlife Services' ADC Form 37. On January 16, 2007 the Port of Seattle submitted a permit application to the US Fish and Wildlife Service to take (harass) depredating bald eagles at SEA. The harassment permit was issued to the POS on March 15, 2007. Other than Alaska, the POS is the first non-federal agency to receive a permit to harass bald eagles. Even though the bald eagle was removed from the federal endangered species list on June 28, 2007, the reporting of bald eagle harassment events and the renewal of this permit every 90-days is still required under the Bald and Golden Eagle Protection Act. Washington State has designated bald eagles as a fully protected species with regard to the protection of its critical habitat, especially that habitat needed for nesting. No eagle nests are known to occur within the SEA 10,000 ft critical area.



Once pumped dry, bald eagles were no longer attracted to the water held between concrete slabs on the nearly completed RWY 16R/34L.

#### 4.11 - HABITAT CONSERVATION

USFWS and WDFW are responsible for species conservation and recovery plans. These plans require the identification of critical habitat when it is associated with the decline of a species. Habitat alterations and developments may be prohibited in areas where critical habitat has been designated or where such changes could result in the inadvertent take of an endangered species. On a case-by-case basis, consultations with USFWS' and WDFW' Biologists will help determine whether critical habitat is affected by airport projects and how mitigation measures should be implemented.

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## 4.12 - WETLAND MITIGATION

Wetland modifications may require permits from various agencies, including the USFWS, U.S. Army Corps of Engineers (USCOE), Ecology (DOE), City of SeaTac, and/or City of Des Moines. Pre-development mitigation may be required for issuance of a permit. The FAA has outlined a series of potential guidelines that are referred to on wetland mitigation banking in the FAA's wildlife section of their homepage for mitigating wetland impacts resulting from project development, (see 40 CFR 1505.3.) Modification of wetland mitigation sites developed for Master Plan Update Projects should be consistent with Section 404 and Section 401 (Appendix F) conditions.

### 4.12.1 - Wetland Regulations

Table 4 lists federal, state, and local laws protecting wetlands or streams. Additional summary information for these permits is available in the *Wetland Regulations Guidebook* (Washington Department of Ecology 1994). The detailed regulatory requirements can be obtained from the responsible agency. These laws may be applicable to some wildlife management actions taken at SEA.

Wetlands identified as part of natural resource mitigation for Master Plan Update projects should be managed in accordance with the Natural Resource Mitigation Plan and Section 404 and Section 401 permit conditions (Appendix F).



*This engine on a Boeing-737 sustained major damage when a female eider duck was ingested during landing at an airport in Maine, November 1995.*

Photo courteously of the National Transportation Safety Board

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**Table 4. Wetland regulations potentially applicable to wildlife hazard management in wetlands at Seattle-Tacoma International Airport.**

Law	Implementation	Jurisdiction	Implementing Agency
<b>Clean Water Act Section 404</b>	Permit required for placement of dredge or fill materials in Waters of the U.S.	Wetlands and other Waters of the U.S.	<i>Army Corps of Engineers/ Environmental Protection Agency</i>
<b>Clean Water Act Section 401</b>	Certification that the proposed project will meet state water quality standards is a condition of federal permit approvals	Federal permits affecting Waters of the U.S., including wetlands	<i>Washington Department of Ecology</i>
<b>Coastal Zone Management Act</b>	A notice of consistency with the state coastal zone management plan is a condition of federal activities, federal license and permit approval, and federal support of local activities		<i>Washington Department of Ecology</i>
<b>State Hydraulic Code</b>	Permit (Hydraulic Project Approval) required for work that affects the natural flow or bed of Waters of the State	Activities affecting Waters of the state, including wetlands that are important to fish life	<i>Washington Department of Fish &amp; Wildlife</i>
<b>Forest Practices Act</b>	Permit required for tree harvest	Restricts harvest activities in and around wetlands	<i>Washington Department of Natural Resources</i>
<b>City of SeaTac Critical Areas Ordinance</b>	Approval for placement of fill material into wetlands and other activities affecting critical areas (subject to Interlocal Agreement between Port of Seattle and City)	Critical areas are defined in the City's ordinance	<i>City of SeaTac</i>
<b>Endangered Species Act</b>	Consultation triggered by federal actions, including permit, planning, or funding decisions.	Activities that directly or indirectly affect federally listed endangered or threatened species and their critical habitat.	<i>National Marine Fisheries Service (for marine and anadromous fish).  U.S. Fish and Wildlife Service for other species.</i>

Pursuant to these laws, permits and approvals have been and will be issued to the Port for various development activities at SEA. These permits and approvals include certain mitigation projects to avoid, reduce, or compensate for the impacts of the development activities on wetlands and streams. Wildlife hazard management at SEA should be designed and implemented in a manner that is consistent with the goals of these mitigation projects.

These goals include the restoration of wetlands and stream buffers to improve aquatic habitat, floodplain, and water quality functions. Enhancement and restoration of these functions will improve ecological conditions in Miller Creek and Des Moines Creek for aquatic organisms. The on-site

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mitigation areas are not planned as mitigation for impacts to avian species that pose aircraft safety concerns<sup>4</sup>. A critical need of the mitigation projects is to restore wetland and stream buffer functions in a manner that avoids creating new avian wildlife hazards and reduces existing avian wildlife hazards.

As discussed in this plan, airport property is subject to a variety of potential wildlife management actions (regulations affecting wildlife management are explained in Sections 4.5 to 4.9, and wildlife management control is discussed in Section 6). In nearly all cases, these management actions can be successfully implemented without interfering with the ability of the on-site mitigation projects to provide the planned ecological functions. In nearly all cases, management actions at the on-site mitigation will involve the hazing or removal of wildlife and minor habitat modification.

These actions are consistent with the planned mitigation, and require no wetland-related permits or approvals.



**A 737-400 aircraft, flying at 10,000' and 314 knots, sustained significant windscreen damage when colliding with a snow goose. The higher speeds common at these altitude result in the greater likelihood of more severe damage.**

The wildlife management control actions presented in this Plan attempt to balance the Port's, FAA's, and USDA Wildlife Service's role in protecting aviation safety with the goal of non-wildlife wetland mitigation and enhancement. Although the Port must retain ultimate authority to identify and respond to wildlife threats to aviation safety, the Plan requires that: (a) the Port secure permits and approvals for any control actions that would result in a significant reduction in mitigation functions, except where immediate action is required to ensure air safety; and (b) any control action that results in a significant reduction in mitigation functions must be compensated for and mitigation functions must be restored as soon as practicable.

Two levels of wildlife management actions are contemplated: those that may have a de minimus reduction in mitigation function, and those that may cause a significant reduction in mitigation functions.

<sup>4</sup> Creating and restoring wetland habitats at an off-site location in Auburn will replace much of the avian habitat functions lost at SEA. Non-avian wildlife using mitigation sites are generally not a hazard to aircraft safety unless they attract avian predators, or move onto active runways. Additional information on this project can be found in the *Natural Resources Mitigation Plan* for the Master Plan Update.



#### 4.12.1.1 - Minor Vegetation Management Activities

This level includes vegetation management activities in mitigation sites that would not result in a significant reduction of mitigation functions, would not require a permit, and would not require a change to an existing permit condition. As a rule of thumb, this would generally include actions that do not alter the ability of a mitigation site to meet performance standards for vegetation, as identified in the mitigation plan. These actions would be exempt from pre-consultation with the permitting agencies. Examples of such management actions include:

- **Selective trimming of vegetation.** If selective trimming of vegetation within mitigation sites is required, it can occur without disruption of the desired functions of the mitigation. Removal of small quantities of vegetation can also occur when mitigation functions are not significantly altered.
- **Increase vegetation density.** Adding new non-attractive native plants to mitigation sites would increase plant density and reduce open/poorly vegetated areas. This action would reduce wildlife use of more open areas and increase the rate of canopy closure over periodically flooded floodplain areas.
- **Replant or replace one type of vegetation with another native plant species.** If one vegetation type is observed to be a wildlife attractant, it shall be replaced with another type. Replacement could occur through physical removal (cutting, up rooting, etc.) or by replanting areas with faster growing species that may out-compete the undesirable plant. Generally, replacement can occur without significant soil disturbance and without affecting the planned wetland functions.
- **Removal of channel obstructions.** Various debris blockages (including beaver dams) could increase the presence of standing water at the mitigation sites. To reduce standing water areas and habitat for waterfowl, it will be necessary to remove these obstructions. (The laws listed in Table 4 above generally include exemptions and/or expedited review procedures for emergency actions and for maintenance activities.)

The above vegetation management actions, if performed, will be reported in the mitigation monitoring reports, required for the Master Plan Update Section 404/401 permit. Reporting will include a description of the action taken, an explanation of why the action was taken, an analysis of the effect of the action on the mitigation site properties, performance standards, and ecological functions. Photographs of the mitigation site prior to and following the management action will be included. An analysis of the effectiveness of the management action in eliminating or reducing the wildlife hazard will also be reported.



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#### 4.12.1.2 - Potentially Significant Management Activities

This level includes wildlife management activities that require permits from agencies regarding Clean Water Act Section 404 and Section 401 compliance, Endangered Species Act review, Hydraulic Project Approval review, and other applicable laws, or changes to conditions of existing permits and approvals. In the unlikely event that wildlife management activities result in significant modifications to non-habitat wetland functions, the Port would apply for the required permits or permit changes prior to conducting these activities, unless immediate action was required to ensure air safety.

If the Port determine that immediate action was required to ensure air safety, the Port would notify the Department of Ecology and other agencies with permitting jurisdiction at the earliest practicable date to consult with them on the actions taken and to be taken and to determine the appropriate mitigation to restore the lost or impaired mitigation functions. Recognizing that activities that would result in a significant reduction in mitigation functions should be employed only as a last resort, the Port will be required to restore the lost or impaired mitigation functions at a ratio of at least 1.5 to 1.0 and to secure any required permits for the mitigation. Examples of such management activities include:

- **Netting of habitat.** A potential management strategy to reduce bird use is to use a pole-supported net system that would reduce bird access to habitat. Placement of physical structures in wetlands, such as support posts, cable anchors, etc. could be subject to HPA and Section 404 permitting.
- **Drainage of wetlands.** Alteration of soil saturation or the extent of jurisdictional wetlands on mitigation sites through excavation of drainage channels, grading, or other hydrologic modification.
- **Significant removal and replacement of vegetation** such that planned mitigation functions could be altered. This could occur if larger scale removal/replanting affected riparian conditions, reduced shading of creeks, or changed other factors important to the mitigation function. As a rule of thumb, significant removal/replacement of vegetation would generally include actions that result in removal of vegetation cover in a mitigation area such that the vegetation performance standards for the mitigation site cannot be met.



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#### 4.13 - PESTICIDE USE

Authorization to use restricted-use pesticides for the removal of hazardous wildlife or a prey-base (e.g., blackbirds, European starlings, rodents, rabbits, insects, earthworms, and weeds) should be limited to Certified Pesticide Operators or persons under their direct supervision. To obtain the necessary license to apply restricted-use pesticides, a person must pass an exam administered by the Washington State Department of Agriculture. All SEA personnel that use restricted-use chemicals must first obtain a pesticide applicator's license or be under the direct supervision of an applicator. Use of all pesticides will strictly adhere to the pesticide label and will follow U.S. EPA, Ecology, and King County guidelines.



#### **Jet crashes, pilot dies - Flock of birds apparently hit experimental aircraft.**

The pilot of a small jet was killed Monday after it crashed on takeoff from Gadsden Municipal Airport after being a part of the taping of a CNN segment about the L-39 Albatross experimental aircraft earlier in the day. Elmo Hahn, 53, had just filled the Czech-made plane with fuel for the flight to his hometown of Muskegon, Mich., and lifted off at about 3:30 p.m. when a flock of birds apparently hit the plane, said R.H. Beavers of International Jets Inc. International Jets mechanic Richard Cline had watched the takeoff from outside the company's hangar at the airport and heard an unusual sound and saw the birds just as the plane was gaining altitude. Cline heard the engine sputter and watched as Hahn apparently tried to pull the throttle back, but lost speed.

Article published Jul 1, 2003

By Lisa Rogers, Staff Writer

**Gadsden Times** on the Web  
NORTHEAST ALABAMA'S LEADING ONLINE NEWS SOURCE

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## 5.0 - RESOURCES

***FAR 139.337(f)(4) Identification of resources to be provided by the certificate holder for implementation of the plan.***

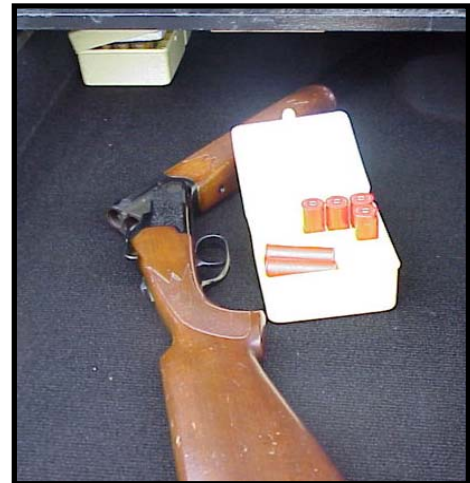
### 5.1 - OVERVIEW

Habitat Management and wildlife control supplies can be purchased from several companies. An adequate supply of equipment will be kept on hand at SEA for use by trained personnel.

### 5.2 - AUTHORIZED AIRPORT SUPPLIES

Supplies that will normally be stocked at the airport include:

- Copies of the recent WHMP
- Pyrotechnic ammunition and launchers
- Bird bangers, screamers, and whistlers
- 12 gauge break action shotgun and ammunition
- Cleaning kits for all firearms
- Field guide for local bird identification
- Mylar tape
- Snare/catch pole
- Cage trap for dogs (e.g., Tomahawk 110B)
- Cage trap for cats/opossums/raccoons (Tomahawk 108)
- Rat/mouse traps snap traps
- Binoculars
- Pellet rifle and pellets
- Latex gloves
- Garbage bags



Shell crackers, a pyrotechnic device shot from a 12 gauge shotgun, travel several hundred feet before exploding loudly.



- Gallon-size re-sealable sandwich bags
- “Prevention and Control of Wildlife Damage” reference manual
- Freezer to preserve bird carcasses found on runways
- Necropsy laboratory supplies

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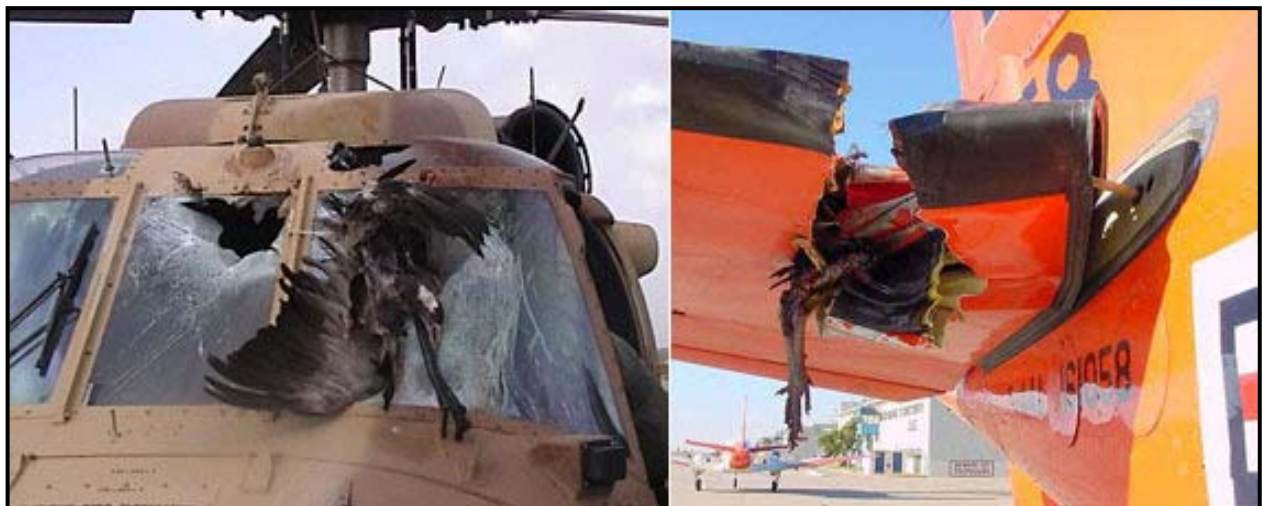
### 5.3 - AIRPORT DUTY MANAGERS AND AIRFIELD OPERATIONS SPECIALISTS

The AOS and ADM vehicles should be stocked with the supplies listed below to facilitate an immediate response to wildlife hazards. They will be responsible for responding to emergency calls from the SEA tower or Airport Operations to disperse animals from the runways. They should maintain radio communications with the tower if there is a situation within the AOA, and the patrols must operate within the air movement areas according to FAA guidelines. At a minimum, supplies to be maintained in their vehicles should include:

- Bird identification field guide
- Binoculars
- Pyrotechnic launcher
- Pyrotechnic ammunition (e.g., bangers, whistlers, etc.)
- Fire extinguisher
- Latex gloves
- Garbage bags
- Daily Wildlife Report forms



In addition to conducting wildlife control and performing numerous other duties on the AMA, the Airport Operations Specialists conduct routine runway inspections for FOD, including wildlife struck by aircraft.



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## 6.0 - WILDLIFE CONTROL PROCEDURES

***FAR 139.337(f)(5) Procedures to be followed during air carrier operations that at a minimum includes—***

***139.337(f)(5)(i) Designation of personnel responsibilities for implementing the procedures;***

Personnel responsibilities are described and delineated in Chapter 2.

***139.337(f)(5)(ii) Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier begin;***

***139.337(f)(5)(iii) Wildlife hazard control measures;***

### 6.1 - OVERVIEW

The Wildlife Patrol should frequently conduct physical inspections of movement areas and other areas critical to wildlife hazard management as part of the daily protocol. The AOSs should document all observed wildlife and record the data on a Daily Wildlife Report (Appendix C). In cases where no animals are seen, it should be indicated that an inspection was conducted and that no animals were observed. A copy of the Daily Wildlife Report for each day should be submitted to the POS Wildlife Biologist. The USDA and Raptor Biologists should also conduct physical inspections of critical areas and report wildlife activity on the Daily Wildlife Report or to the AIRMAN database via the pocket PC. During periods of exceptionally heavy wildlife activity (e.g., migratory periods, outbreaks of insects, etc.), the Airport Duty Managers should work with the POS Wildlife Biologist to broadcast an appropriate verbal statement over the Automated Terminal Information Service (ATIS). SEA has a permanent Notice to Airmen (NOTAM) advising pilots of bird activity the vicinity of SEA.

Wildlife that is identified as hazardous during and after the completion of the recommended habitat modifications should be controlled using accepted direct control techniques. Wildlife hazards at airports are extremely variable and complex, therefore, it is essential to adopt a flexible, innovative, and adaptive approach to managing such hazards. Wildlife identification guides and handbooks will be available for use by the Wildlife Patrol at SEA. Of particular value is the “Prevention and Control of Wildlife Damage” manual jointly produced by the University of Nebraska, Wildlife Services, and the Great Plains Agricultural Council. This 2-volume set details species-specific damage assessment, and includes an in-depth discussion of methods of dispersal for each species and is available on the internet. In addition, Transport Canada has also produced a valuable reference manual on wildlife control procedures at airports that is also available online, entitled: “Wildlife Hazards at Airports”. Airport personnel should be trained to identify hazardous wildlife at SEA (refer to Chapter 8), and should select dispersal methods that are appropriate to the type of animal causing the hazard.

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## 6.2 - WILDLIFE PATROL

### 6.2.1 - Port of Seattle

The Wildlife Patrol consists of the POS Wildlife Biologist, Airport Duty Managers, Airfield Operations Specialists, USDA Wildlife Services, and other personnel certified to use firearms, pyrotechnics or trapping techniques to control hazardous wildlife. The patrol should monitor and respond to wildlife hazards on the airfield and should coordinate their activities through the POS Wildlife Biologist to ensure a secure environment is maintained for safe airport operations. This plan recognizes the wildlife patrol as aviation -security personnel with respect to RCW 9.41.300 as amended 24 March 2004. The crew should be trained in wildlife identification, proper control techniques, and safe operations as outlined in Chapter 8. The crew should have a radio-equipped vehicle and adequate wildlife control supplies (Chapter 5). The patrol should maintain clear communications with

Airport Duty Managers and tower, in accordance with FAA radio protocols. The crew should also report all observations of wildlife activity on the Daily Wildlife Report and indicate the airfield condition on the electronic 24 Hr. Airfield Inspection Report. Completed forms should be forwarded to POS Wildlife Biologist for frequent review. Routine runway sweeps should be conducted at least once per day, and the presence of any dead animals found from strikes or suspected strikes should be recorded online to the National Wildlife Strike Database (Appendix C). In cases where no wildlife hazards were seen, it should be indicated that an inspection was conducted and that no hazards were observed on the electronic 24-Hr Airfield Inspection Report Sheet. Other wildlife-related activities (e.g., notable hazards, animals killed or dispersed, unusual wildlife behavior, etc.) should be documented on the Daily Wildlife Report. All dead birds found on runways will be considered the result of a strike unless the death was obviously due to some other cause. Any bird remains that are found should be bagged, labeled (e.g., time and date found, location on runway, prevailing wind conditions, person who found remains, etc.), and placed in a freezer for later inspection and identification. Wildlife strikes may be reported directly to the FAA via Internet at <http://wildlife.pr.erau.edu/strikeform/birdstrikeform.html>, but a printout of the report must also be immediately submitted to POS Wildlife Biologist so that the situation can be assessed.



**Live traps are extremely selective and very effective at reducing population densities of European starlings at airports.**

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### 6.2.2 - USDA-Wildlife Services Assistance

The Port of Seattle currently has a Cooperative Service Agreement with USDA-APHIS Wildlife Services to assist SEA personnel in deterring or removing European starlings and rock pigeons from the airfield, but WS may also provide assistance in dispersing other hazardous wildlife from the airfield and adjacent areas if hazards are identified. Some supplies such as European starling traps, vertebrate pesticides and chemical capturing agents may be available through Wildlife Services for conducting specific control operations. Some control methods, such as alpha chloralose for waterfowl, are restricted to certified Wildlife Services personnel only, but Wildlife Services can provide assistance if a unique situation arises.



Wildlife Services provides a USDA Biologist that currently assists SEA with conducting surveys and control activities involving European starling, goose, pigeon and other wildlife hazards on the airport. This USDA Biologist can also assist with other wildlife control activities including those involving coyote, raccoon, and beaver. Many of the control techniques for mammalian species differ from traditional bird hazard control techniques, and may require restricted-use equipment and permits only available to Wildlife Services.



These young great horned owls were removed from a nest at the end of a runway and successfully raised by other owl adults before being released in northern Washington.

### 6.2.3 - Raptor Strike Avoidance Program

Raptor trapping efforts since the program began in June 2001, to support the practice of relocating these live-trapped birds to areas with a richer prey base. The overall goal of reducing raptor densities at SEA, especially those young and migrating birds that are theorized to be at higher risk of being struck by aircraft. Over 160 raptors have now been relocated. Only one raptor, a red-tailed hawk, is known to have returned to SEA after being absent for nearly two years. This hawk was originally captured at SEA as an immature bird. The services of the Falcon Research Group Inc. are currently being contracted for these raptor relocation services.

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#### 6.2.4 - King County Animal Control Assistance

King County Animal Control is also available to help with free-roaming dogs and cats. If animal control assistance is needed on the airfield, call (206) 296-PETS or the other resources listed in Chapter 10. If the animal poses an immediate threat to aviation, wildlife control personnel should attempt to catch, disperse, or lethally remove it.



### 6.3 - GENERAL WILDLIFE CONTROL MEASURES

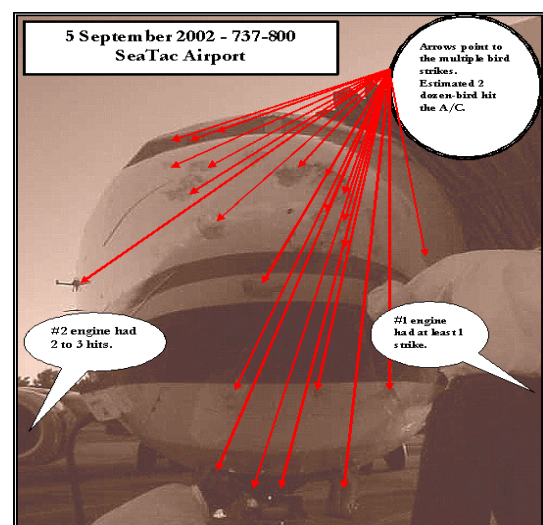
**CFR 14 – Part 139.337 (a) ...each certificate holder shall take immediate measures to alleviate wildlife hazards whenever they are detected.**



Consequently, wildlife hazards observed at SEA will be analyzed by members of the Wildlife Patrol to determine a practical solution that will be employed in a timely manner, commensurate with the perceived risk(s). The initial response for most species will be to haze them with frightening devices, followed by other direct control methods, including lethal removal, when necessary

As a wildlife population near the airfield increases in abundance, so does likelihood that individual members of the population will enter critical airspace used by arriving and departing aircraft. However, wildlife abundance is not the sole indicator for assessing the strike hazards, rather the entire dynamic of the animals' abundance, body size, and behavioral attributes must be evaluated in combination. Notable attributes of wildlife behavior that should be examined to properly assess the risk to aircraft include direction and altitude of wildlife movements in relation to aircraft, flocking characteristics, frequency of visits to a given site, duration of visit, and activity while on site (e.g., nesting, loafing, feeding, soaring, etc.), to name a few.

A properly formulated wildlife management plan should be based upon a comprehensive biological evaluation of the situation. A primary key to successful wildlife control is persistence, innovation, and a clear understanding of the risks associated with certain species, that either by their location, size, behavior and/or number create a hazardous situation for the current state of the airfield. Most control techniques retain their effectiveness when used judiciously and in conjunction with other methods. Some methods such as pesticides or leg-hold traps are only effective and legal for certain species and situations. Therefore, the methods chosen will depend largely on the situation and the species involved. Finally, personnel involved in direct control should be aware of the potential diseases that wildlife can carry and should take appropriate precautions.



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### 6.3.1 - Bird Control



Over 50 species of birds may occur at SEA and several of these represent a highly significant threat to aviation safety. Although European starlings are of great concern, migratory species, especially geese and other species of flocking waterfowl are also a great concern. Juvenile birds may also constitute an unusual wildlife hazard because of their general unfamiliarity with the airport environment at SEA. The “Prevention and Control of Wildlife Damage” manual discusses a number of methods that may be used to haze birds from the airport. It’s important to reemphasize that an integration of multiple methods should be employed for maximum effectiveness. If properly applied, the techniques discussed in this reference manual should reduce most hazards involving species of concern at SEA.

### 6.3.2 - Mammal Control

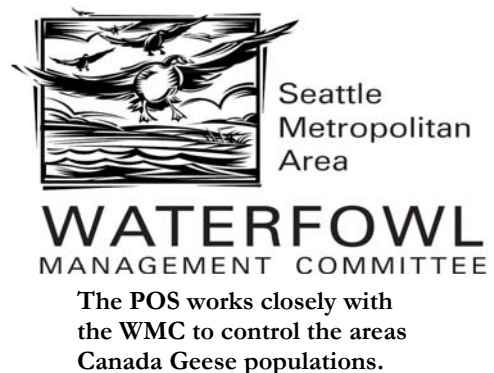
Potential hazards from the majority of mammalian species at SEA have been reduced through habitat modifications and the construction of fencing and other exclusionary devices. With the exception of a few coyotes, large mammals such as deer have already been excluded from using the airfield by the perimeter fence. However, smaller mammals still exist on the airfield in low to moderate densities, and can provide an attraction to larger predators and raptors. The POS Wildlife Biologist should monitor these rodent and rabbit populations.



## 6.4 - APPROACH FOR IMPLEMENTING CONTROL MEASURES

### 6.4.1 - Control Methods

It is anticipated that wildlife hazards associated with the mitigation sites can be effectively reduced using known control methods described in Section 6.1 (Wildlife Control Procedures), without compromising the objectives for which the mitigation project was intended. However, it is conceivable that some habitat alterations such as adding or clearing vegetation or altering hydrologic regimes on a site may become necessary. Alteration of hydrology or vegetative habitat would only be used as a last resort if all other methods fail to abate wildlife hazards to a safe level (Figure 1, Sec. 6).



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#### 6.4.2 - Decision Model For Implementing Control Methods

To facilitate SEA's effort in assessing and responding to hazards, a flow chart for assessing the wildlife hazard and implementing control methods was developed (Figure 1, Section 6). Given the extremely variables and complex nature of wildlife hazards at airports, it is essential to adopt a flexible, innovative, and adaptive approach to managing unexpected hazards that may result from the airfield environment, especially the mitigation sites.



If it is determined that an actual wildlife hazard exists due to one or more of the risk factors (species, location, behavior, number, and/or airfield conditions) that were identified through monitoring, then the observer takes direct action immediately to resolve the situation. The methods used to reduce the hazard(s) will become increasingly more aggressive and used in combination with one another until the wildlife responds favorable or the hazard is abated. In those cases where the animals are non-respondent or situation is becoming increasing more hazardous, lethal removal will be necessary.



Concurrent with the immediate action required to resolve a given situation at a given moment is the long-term management approach required to resolve reoccurring problems that have been observed with frequency. This long-term approach is comprised primarily of managing people (e.g., training, public education, reviewing proposed construction plans) and managing habitat/prey (e.g., modify vegetation, exclude/remove attractants). If the frequency of these hazardous situations and/or the risks to aviation increase, more aggressive actions must be proposed, planned, reviewed and implemented. For example, the Port may first start with

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selective thinning of vegetation, and increasing the intensity of the modifications as needed to include replanting new species and/or removing certain undesirable ones. The most extreme scenario would include reducing or eliminating larger areas of vegetation where conditions are deemed necessary based on the proactive management approach (Figure 1). Proactive management includes evaluating Port data and records of communication to develop creative, effective, cost-efficient solutions to reduce the degree to which direct control actions are needed in the future. The amount of effort and planning required to implement more aggressive project plans is expected to increase with the environmental significance of the proposed action. Therefore, a dramatic change to the habitats near the airfield, such as significantly altering hydrology at the mitigation sites, is highly unlikely.

In the most extreme scenario, the water level may have to be reduced or eliminated, or the wildlife-attracting vegetation removed and replaced with another type. The model outlined in Figure 1 provides a systematic and incremental approach for determining whether this scenario is necessary to ensure air traffic safety. Prior to altering hydrology at these sites, SEA will consult with all appropriate regulatory agencies to identify alternative forms of vegetation that meet wildlife abatement efforts without compromising the mitigation objectives. To facilitate SEA's effort in assessing and responding to hazards, a flow chart for assessing the wildlife hazard and implementing control methods was developed (Figure 1). Given the variable and complex nature of wildlife hazards at airports, it is essential to adopt a flexible, innovative, and adaptive approach to managing unexpected hazards that may result from the airfield environment, especially the mitigation sites.



**Result of a deer strike in British Columbia, Canada. Only the deer was injured.**

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If it is determined that an actual wildlife hazard exists due to one or more of the risk factors (species, location, behavior, number, and/or airfield conditions) that were identified through monitoring, then the observer takes direct action immediately to resolve the situation. The methods used to reduce the hazard(s) will become increasingly more aggressive and used in combination with one another until the wildlife responds favorable or the hazard is abated. In extreme cases where the animals are non-responsive or situation is becoming increasingly more hazardous, lethal removal will be necessary.

Concurrent with the immediate action required to resolve a given situation at a given moment is the long-term management approach required to resolve reoccurring problems that have been observed with frequency. The long-term approach is comprised primarily of managing habitat/prey (e.g., exclude/remove attractants, modify vegetation) and human behavior/practices (e.g., training, public education, reviewing proposed construction plans). If the frequency of these hazardous situations and/or the risk to aviation increase, more aggressive actions must be proposed, planned, reviewed and implemented. For example, the Port may first start with selective thinning of vegetation, and increasing the intensity of the modifications as needed to include replanting new species and/or removing certain undesirable ones. The most extreme scenario would include reducing or eliminating larger areas of



**Even today some operators still consider wildlife hazard management at airports an insignificant issue. This 2007 photo was taken from window of MD-80 before departure from a major international airport in the United States.**

vegetation where conditions are deemed necessary based on the adaptive management approach (Figure 1). In addition to adapting to emerging situations, adaptive management includes evaluating Port data and records of communication to develop creative, effective, cost-efficient solutions to reduce the degree to which direct control actions are needed in the future. The amount of effort and planning required to implement more aggressive project plans is expected to increase with the environmental significance of the proposed action. Therefore, dramatic changes to the habitats near the airfield, such as significantly altering hydrology at the mitigation sites, are highly unlikely. SEA will consult with the appropriate regulatory agency to identify alternative means to rectify recurring problems well before modifying the hydrology of wetlands or riparian areas is considered.

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## 6.5 - AIRFIELD COMMUNICATION

### ***139.337(f)(5)(iv) Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower;***

All wildlife control personnel should be equipped with radios and have proper training to contact the air traffic control tower (ATCT). If an immediate hazard exists that might compromise the safety of air traffic at SEA, the Airport Duty Manager should coordinate with the air traffic control tower, and if necessary, detain arriving or departing air traffic until the hazard is eliminated. In extreme cases, the runway may need to be closed temporarily at the discretion of the Airfield Manager, Airport Duty Manager, POS Wildlife Biologist, Airfield Operations Specialists or the ATC tower. Although the ATCT cannot be expected to monitor all wildlife hazards on the airfield and still direct air traffic, tower personnel should notify the Airport Duty Manager immediately if pilots report hazards or any such hazards are observed from the tower.



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# Flow Chart for Resolving Wildlife Hazards Near Seattle-Tacoma International Airport

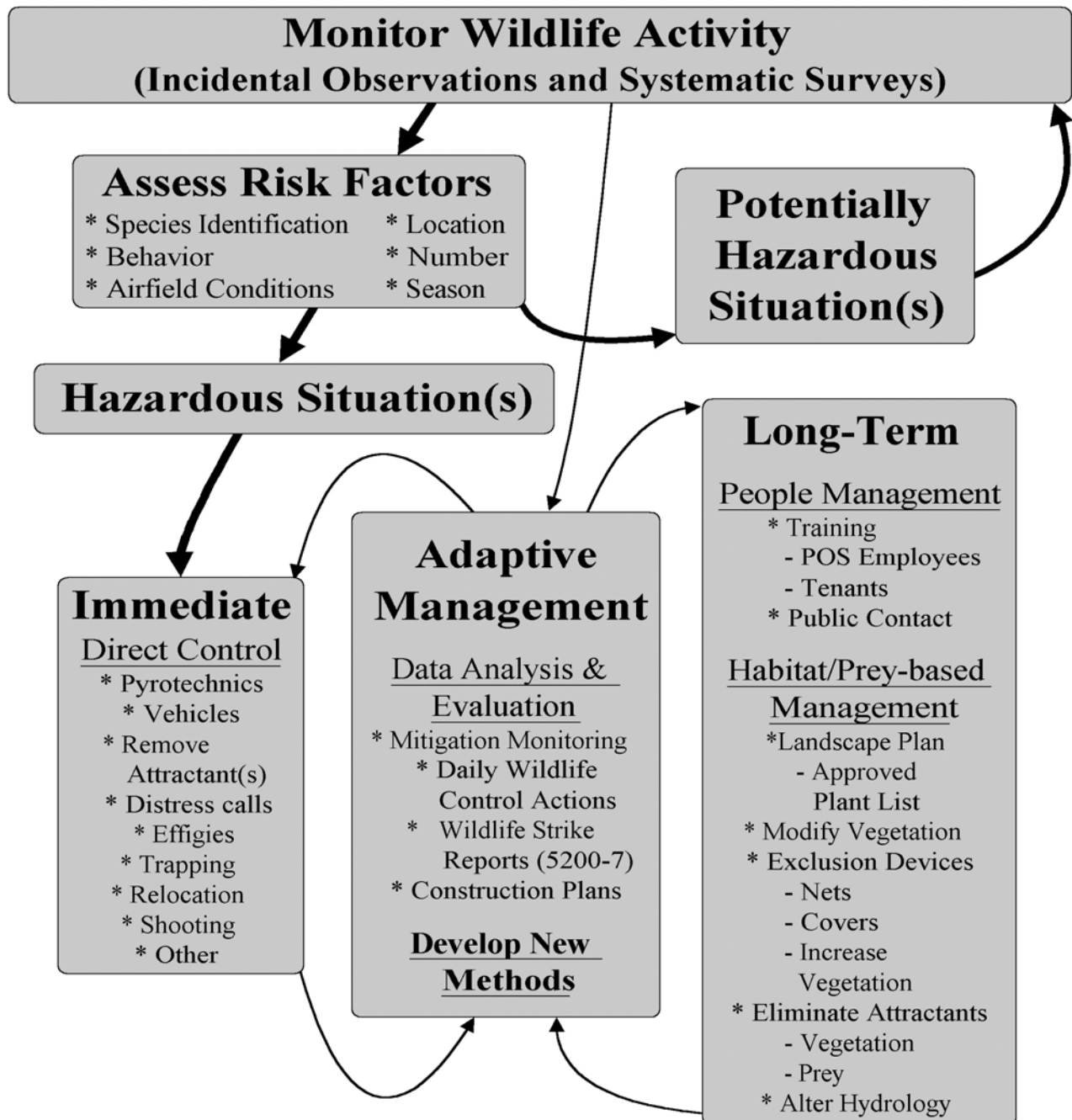


Figure 1. Habitat management actions will be consistent with Section 404/401 mitigation conditions and other regulatory requirements, including those discussed in this plan.

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## 7.0 - EVALUATION

### 7.1 - OVERVIEW

The WHMP will be evaluated at least annually. The Wildlife Hazard Working Group will evaluate the effectiveness of the WHMP at reducing wildlife strikes at SEA and monitor the status of hazard reduction projects, including their completion dates as provide in Table 2, Chapter 3.

### 7.2 - MEETINGS

The Wildlife Hazard Working Group will meet at least once per year, but the group may convene more regularly if situations warrant, as determined by the POS Wildlife Biologist.

### 7.3 - WILDLIFE STRIKE DATABASE

The POS Wildlife Biologist will maintain a database of wildlife strikes and populations on the airfield and surrounding areas. Information from this database will be used to identify trends and to monitor any increases in wildlife hazards on the airfield. If unacceptable



increases in wildlife populations are observed, the cause should be determined and the WHMP modified to address the problem. The POS Wildlife Biologist should enter the records weekly into a computerized database. Winfield Solutions has developed an AIRMAN (Airport Information Manager) a computer program specifically designed for tracking wildlife control activities at airports, and can assist the airport in setting up the computerized record system. .

### 7.4 - AIRPORT EXPANSION

Airport expansion plans will be reviewed by the POS Wildlife Biologist to ensure that new developments will not inadvertently result in increased wildlife hazards to aircraft operations. If appropriate, they will coordinate designs with the FAA and Wildlife Services.

### 7.5 - FAA INVOLVEMENT

FAA Regional Certification Inspectors and personnel from the Seattle Airports District Office (ADO) should be invited to make comments on the WHMP and to attend annual meetings on plan modifications.

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Nr 1 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003



Nr 2 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003



Nr 3 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003



Nr 4 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003



Nr 5 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003



Nr 6 - Air Reldan Duck Strike  
Lakefront Airport, LA - March 9, 2003

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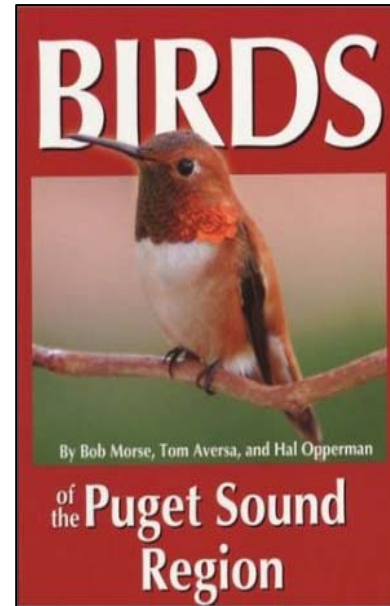
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## 8.0 - TRAINING

### 8.1 - OVERVIEW

Training is essential for those personnel involved in the WHMP. The POS Wildlife Biologist should ensure that all personnel that might be working in a wildlife deterrence capacity are trained annually in the proper selection and application of control methods, including species identification and reporting procedures as recommended by the FAA. Training will also include a description of special procedures for wildlife control management actions in wetland mitigation sites, wetlands, streams, and ditches. The SEA wildlife training program generally follows AC 150/5200-36 and consists of a total of 8 hours. These efforts include:

- 2-hours of communication procedures for operating on the AOA and AMA,
- 4-hours of wildlife hazard management awareness, environmental laws, bird identification and safe/effective firearm/pyrotechnic use in the classroom, and
- 2-hours at the firing range concentrating on the safe use of pyrotechnics and live rounds.



### 8.2 - STANDARD TRAINING

Wildlife control personnel should receive training in mitigating wildlife hazards at airports, including an overview of laws associated with wildlife control (including Section 404 of the Clean Water Act, State Hydraulics Code, Endangered Species Act, and Local Sensitive Areas Codes). Training should also include techniques used for prey-base reductions, firearm and pyrotechnic safety including hands-on training, and wildlife identification and dispersal techniques. Airport communications and driving should also be provided to all employees involved in wildlife control operations that may require them to operate on the AMA.



### 8.3 - USDA-WILDLIFE SERVICES TRAINING

Wildlife Services has instructors that teach a course for wildlife patrol personnel. The purpose of the course is to familiarize personnel involved with airport operations in basic bird and mammal identification and dispersal techniques. The course also involves hands-on training using pyrotechnics, and other deterrent equipment, with an emphasis on safety. This training should be offered to all personnel responsible for dispersing wildlife at SEA in whole or part. The training can be customized to fit the needs of individual recipients or situations.

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During fall 2007, this Boeing 737 returned to Philadelphia after a serious bird strike. The first officer suffered some cuts to his face from broken glass. Despite the damage, the landing was uneventful and many of the 143 passengers were unaware of the extent of the damage.

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## 9.0 - MONITORING WILDLIFE HAZARDS

*Sec. 139.337 (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.*
- (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.*

### 9.1 - OVERVIEW

Although it is impossible to accurately predict exactly how wildlife population dynamics will change over time or will be altered by the modifications to existing on-site wetland habitat, changes should be anticipated. Long-term monitoring will be necessary to ensure that a hazardous situation does not develop. One objective of the mitigation projects is to eliminate habitat already known to be attractive to hazardous wildlife. Therefore, acceptable hazard levels will not be based on existing wildlife populations, but rather on population trends of hazardous wildlife on and near SEA.

### 9.2 - ONGOING WILDLIFE HAZARD ASSESSMENT

SEA had its first wildlife hazard assessment conducted in the late 1970's by the USFWS' Animal Damage Control, the agency that eventually became known as the USDA Wildlife Services. That assessment was conducted because of the concern over the tens of thousands of European starlings that frequented the airfield and roosted in the trees inside the SW end of the AOA. Shortly after that assessment, SEA developed a formal wildlife control program and later adopted the nations first Wildlife Hazard Management Plan.

FAR 139.337 (b) states an assessment should be conducted after anyone of four triggering events occurs. Because one or more of these triggering events occurs at irregular intervals at SEA, it is most prudent for the POS to conduct an Ongoing Wildlife Hazard Assessment. This assessment is comprised at least 4 sets of 3-minute surveys each month, throughout the year. These surveys are conducted by either the POS Wildlife Biologist or USDA Biologist. The locations of these three-minute survey stations are illustrated in Appendix E.



Aircraft strike with a turkey vulture.

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### 9.3 - NEED FOR MONITORING MITIGATION SITES

The current mitigation plan allows the Port of Seattle to split wetland functions by creating new wetlands for wildlife in Auburn, WA while restoring wetlands for hydrologic functions on SEA property. Hydrologic functions have been restored in-basin adjacent to the AOA by creating scrub-scrub wetland habitat. The goal is to create a density of vegetation so extreme that it discourages the hazardous wildlife species from using these sites. The POS' wetland mitigation site in the City of Auburn is located just over 5-miles from SEA. Although the on-site mitigation projects are actually expected to result in decreased wildlife use of the sites, Wildlife Services and the FAA recognize the potential for unexpected wildlife hazards associated with projects. The monitoring and control program discussed in this chapter was designed to detect and respond to any unforeseen wildlife hazards at the on-site mitigation sites.



A total of 10 wetland sites, occurring in two watersheds, are being systematically monitored by the USDA Wildlife Services for hazardous wildlife near SEA (Appendix E). The following wetland mitigation sites and the associated Miller Creek and Des Moines Creek flood plains are slated for conversion to scrub/shrub wetland habitat to physically exclude waterfowl and other large hazardous wildlife from using these areas. The single exception is Lake Reba, an area where no wetland mitigation enhancements have been conducted but data is being collected on the same routine schedule to serve as a study control for this sampling regiment.

1. Miller Creek Watersheds (north and west of runways)
  - a. Creek Relocation and Flood Plane Enhancement (**Vacca**)
  - b. Lora Lake Wetland Mitigation Enhancements (**Lora**)
  - c. Nursery Wetland Mitigation Enhancements (**Nursery**)
  - d. Wetland **A-17a**
  - e. Wetland **A-17b**
  - f. Lake Reba (the study **control** site with no enhancements)

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2. Des Moines Creek Watershed (south of the runways)
  - a. WSDOT Wetland Mitigation Site (**SR509**)
  - b. Des Moines Creek Regional Detention Facility (formally Northwest Ponds)(**Tyee**)
  - c. Creek Relocation and Wetland Enhancements (**Tyee**)
  - d. Tyee Valley Golf Course Wetland Enhancement (**Tyee**)

Per a formal agreement between the State of Washington and the Port of Seattle, the SR 509 Wetland Mitigation Site will be monitored in perpetuity. The USDA Wildlife Services is currently monitoring their site under contract with the Washington Department of Transportation. The SR509 wetland mitigation site, the headwaters of Des Moines Creek, is owned by WDOT.



**Over 4,000 woody plants were used at Vacca Farms to produce shrub-scrub habitat in an effort to exclude waterfowl.**

The goal of this monitoring program is to detect and immediately abate wildlife hazards associated with the mitigation projects. In the event wildlife is observed that poses a threat to air safety, appropriate control methods will be immediately implemented, even though such actions may bias the survey data. This approach helps ensure aviation safety and yet still provides valuable data. The behavioral response exhibited by each species to a given control method will be recorded, and where possible factored into the final analysis.

## 9.4 - FACTORS TO BE ASSESSED

Several factors will be used to assess wildlife hazards associated with the mitigation sites within the Miller Creek and Des Moines Creek watersheds, all of which will attempt to place wildlife abundance in the context of hazards to arriving and departing aircraft. The most hazardous types of wildlife that might be attracted to mitigation projects were identified, and monitoring designs were selected to most accurately sample these target species. Consequently, some of the smaller, more, solitary species may be underestimated by the survey technique. This was considered an acceptable bias because smaller, solitary birds typically present a lower hazard to aircraft. Factors that will be assessed for each species at each mitigation site within a 10,000-foot radius of SEA are as follows:

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- Abundance of animals throughout the day and year (seasonal)
- Distance, direction and altitude of wildlife movements through natural immigration and emigration into the area
- Direction (relative to the airfield) and altitude of wildlife movements in response to a control action
- Nesting activity on the sites
- Correlation between wildlife use at each site and depth, surface area, and duration of water inundation
- Correlation between wildlife use and vegetative cover, and to the extent possible, composition at each site

## 9.5 - MONITORING METHODS

### 9.5.1 - Target Species

The surveys are designed to focus primarily on large, flocking birds because of their mobility and potential threat to aircraft safety. The surveys will identify trends and will not provide an absolute estimate of population sizes. Waterfowl (geese and dabbling ducks), raptors (hawks, owls, etc.), European starlings, blackbirds, crows/ravens, shorebirds, and wading birds (herons) are the primary types of hazardous wildlife that may be attracted to the mitigation sites. Mammal activity will also be recorded through incidental observations, but due to sampling design, mammals will likely be underestimated by the systematic surveys. Beaver is a mammalian species of great concern because of its propensity to build dams, thereby, altering the hydrologic and vegetative regimes on site in favor of creating preferred habitat for waterfowl.



Over 50 species of birds frequent SEA, one of which is the Short-eared Owl.

### 9.5.2 - Systematic Surveys

Systematic surveys of the wetland mitigation sites will be conducted by the USDA Wildlife Services for at least the first five years after construction of the sites is complete. The wildlife hazard potential of the sites will be reassessed at the end of the fifth year to determine if the monitoring should be changed, a decision that will depend in large part on the growth status (percent cover) of the plant community. Surveys will be conducted at least once per week using a “point count” survey method, wherein all

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wildlife within the plot that are seen or heard from a fixed point during the sampling period will be recorded. A longer than normal sampling period was selected to provide a better assessment of localized flight patterns of birds at the sites. The animal's activities will be noted whenever possible to assess why they are attracted to the site. The direction and altitude of the animal's ingress or egress to the site will also be recorded. The start time of each survey will be categorically varied by morning, midday, and evening to identify potential peak use periods. An index of abundance over time for each species will be developed from these data.

In addition to time-area counts, a flyway count will be conducted 2 times per month for a 20-minute period, wherein all birds flying into or over the sites will be recorded, along with their altitude and direction of travel. Their movements will be noted in relation to aircraft arrival and departure patterns because this will enable a more accurate assessment of the relative hazards posed by wildlife at each site.



**Waterfowl, such as these scaup, have been identified to species by the Smithsonian Institution and are known to cause great damage and personal injury as seen here. Several hrs after departing SEA for Medford, OR, the pilot was injured after his Dash 8 aircraft struck a flock of scaup.**

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### 9.5.3 - Opportunistic Observations

A map of each of the mitigation sites will be overlaid with an alpha-numeric grid or using GIS technologies so that precise locations of individual animals can be plotted. The surface area and configuration of standing water during each survey will be estimated to the extent possible (the watered edges may be visually obscured by the vegetative canopy) by sketching the water boundaries on a map grid, and the water depth recorded. Estimates of vegetative cover will be provided by the the USDA Wildlife Services, the agency responsible for doing the annual evaluations of plant growth using photomonitoring that is conducted each season. Wildlife use (e.g., abundance, behavioral activities) will be correlated with the plant cover estimates to determine if the vegetation is achieving the desired effect of precluding hazardous wildlife, and if not, steps will be taken to determine what can be done to alleviate the wildlife attraction to the site.

### 9.5.4 - Opportunistic Observations

The POS Wildlife Biologist and a USDA Biologist are currently working on the airfield to reduce hazards unrelated to the wetland mitigation projects. However, due to the proximity of the mitigation sites to the airfield, frequent incidental observations of the mitigation sites will be made, and any wildlife activity at the sites recorded. Many unique hazards may be observed outside of the relatively brief systematic survey periods, and these incidental observations will likely provide some of the most valuable information of wildlife use of the sites. In these situations, immediate action will be taken to reduce the hazard and the animals' responses to the action will be documented.



## 9.6 - CONTROL METHODS

It is anticipated that wildlife hazards associated with the mitigation sites can be effectively reduced using known control methods described in Section 6 (Wildlife Control Procedures) without compromising the objectives for which the mitigation project was intended. However, it is conceivable that some habitat alterations such as adding or clearing vegetation or altering hydrologic regimes on a site may become necessary. Alteration of hydrology or vegetative habitat would only be used as a last resort if all other methods fail to abate wildlife hazards to a safe level (Figure 1, Sec. 6).

## 9.7 - DECISION MODEL FOR IMPLEMENTING CONTROL METHODS



To facilitate SEA's effort in assessing and responding to hazards, a flow chart for assessing the wildlife hazard and implementing control methods was developed (Figure 1, Section 6). Given the extremely variables and complex nature of wildlife hazards at airports, it is essential to adopt a flexible,

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innovative, and adaptive approach to managing unexpected hazards that may result from the airfield environment, especially the mitigation sites.

If it is determined that an actual wildlife hazard exists due to one or more of the risk factors (species, location, behavior, number, and/or airfield conditions) that were identified through monitoring, then the observer takes direct action immediately to resolve the situation. The methods used to reduce the hazard(s) will become increasingly more aggressive and used in combination with one another until the wildlife responds favorable or the hazard is abated. In those cases where the animals are non-respondent or situation is becoming increasing more hazardous, lethal removal will be necessary.

Concurrent with the immediate action required to resolve a given situation at a given moment is the long-term management approach required to resolve reoccurring problems that have been observed with frequency. This long-term approach is comprised primarily of managing people (e.g., training, public education, reviewing proposed construction plans) and managing habitat/prey (e.g., modify vegetation, exclude/remove attractants). If the frequency of these hazardous situations and/or the risks to aviation increase, more aggressive actions must be proposed, planned, reviewed and implemented. For example, the Port may first start with selective thinning of



Altering the habitat type from open-water wetlands to scrub-shrub wetlands will help discourage waterfowl and other large flocking birds from aggregating at these sites within the airport's two-mile critical zone.

vegetation, and increasing the intensity of the modifications as needed to include replanting new species and/or removing certain undesirable ones. The most extreme scenario would include reducing or eliminating larger areas of vegetation where conditions are deemed necessary based on the proactive management approach. Proactive management includes evaluating Port data and records of communication to develop creative, effective, cost-efficient solutions to reduce the degree to which direct control actions are needed in the future. The amount of effort and planning required to implement more aggressive project plans is expected to increase with the environmental significance of the proposed action. Therefore, dramatic changes to the habitats near the airfield, such as significantly altering hydrology at the mitigation sites, are highly unlikely.

In the most extreme scenario, the water level may have to be reduced or eliminated, or the wildlife-attracting vegetation removed and replaced with another type. The model outlined in Figure 1 provides a systematic and incremental approach for determining whether this scenario is necessary to ensure air traffic safety. Prior to altering hydrology at these sites, SEA will consult with all appropriate regulatory agencies to identify alternative forms of vegetation that meet wildlife abatement efforts without compromising the mitigation objectives.

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## ***“Airport 1997”***

Reprinted with permission from the artist, Alexis Rockman

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## 10.0 - RESOURCES

### 10.1 - FAA RESOURCES

#### Certalerts

- Certalert 87-09: Wildlife Hazard Management Plan Outline
- Certalert No. 98-05: Grasses Attractive To Hazardous Wildlife
- Certalert No. 04-09: Relationship Between FAA And Wildlife Services
- Certalert No. 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 08-01: AC 150/5200-28D Notices to Airmen (NOTAMs) for Airport Operators

#### Advisory Circulars

- AC 150/5200-32A, Reporting Wildlife Aircraft Strikes
- AC 150/5200-33B, Hazardous Wildlife Attractants On Or Near Airports
- AC 150/5200-34A, Construction or Establishment of Landfills Near Public Airports
- 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

#### Memorandum of Understandings

- Memorandum of Understanding between the United States Department of Transportation, Federal Aviation Administration and the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services.
- Memorandum of Agreement between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes.

### 10.2 - REGULATORY AGENCIES

#### FEDERAL AVIATION ADMINISTRATION (FAA)

1601 Lind Ave., SW, Ste. 250  
Renton, WA 98055-4056

##### **Safety and Standards Branch**

(425) 227-1621 - Certification Officer

(425) 227-2607 - Certification Officer

##### **Seattle Airports District Office (ADO)**

(425) 227-2657 - Supervisor

(425) 227-2653 - Environmental Specialist

#### FAA STAFF WILDLIFE BIOLOGIST (WA D.C.)

FAA Airport Safety and Compliance  
FAA-AA5-317  
800 Independence Ave., SW  
Washington, DC 20591  
(202) 267-3389

#### MIGRATORY BIRD AND EAGLE PERMITS

##### ***U.S. Fish and Wildlife Service (Permitting)***

Migratory Bird Permits

911 NE 11th Ave.

Portland, OR 97232-4181

(503) 872-2715

#### THREATENED AND ENDANGERED SPECIES

##### ***U.S. Fish and Wildlife Service (T&E Species)***

North Pacific Coast Ecoregion

Western Washington Office

510 Desmond Drive SE, Suite 102

Lacey, WA 98503

(360) 753-9440

#### MIGRATORY BIRD ENFORCEMENT

##### ***U.S. Fish and Wildlife Service (Law Enforcement)***

(425) 883-8122

#### STATE WILDLIFE ENFORCEMENT (King Co.)

##### ***Washington State Department of Fish and Wildlife***

Law Enforcement - Region 4

16018 Mill Creek Blvd.

Mill Creek, WA 98012

(425) 775-1311 ext. 115

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### **STATE PERMITS – BODY GRIPPING TRAPS**

#### ***Washington State Department of Fish and Wildlife***

Enforcement Program – All regions  
600 Capitol Way North  
Olympia, WA 98501-1091  
(360) 902-2515 - Main Switchboard  
FAX (360) 902-2155

### **STATE THREATENED & ENDANGERED**

T&E Section, NRB Office - 5<sup>th</sup> floor  
600 Capitol Way North  
Olympia, WA 98501-1091  
(360) 902-2694

### **City of Normandy**

801 SW 174th St  
Normandy Park, WA 98166  
(206)248-7600

### **City of Des Moines**

21900 11th Ave S  
Des Moines, WA 98198  
(206) 878-3301

## **10.4 - TECHNICAL ASSISTANCE**

### **U.S. Department of Agriculture, Wildlife Services**

720 O'Leary St., NW  
Olympia, WA 98502  
(360) 753-9884 - Olympia  
(253) 852-4785 - Renton

### **Washington State University Cooperative**

#### **Extension of King County**

700 5<sup>th</sup> Ave. Swt. 3700  
Seattle, WA 98104-5037  
(206) 296-3900

### **Washington State Department of Agriculture (Pesticides Management)**

P.O. Box 42589  
Olympia, WA 98584  
(360) 902-2010

## **10.5 - RELATED INFORMATION**

### **Prevention and Control of Wildlife Damage**

<http://www.ces.ncsu.edu/nreos/wild/wildlife/prevent.html>

### **Federal Aviation Administration (FAA)**

[http://wildlife-mitigation.tc.faa.gov/public\\_html/index.html](http://wildlife-mitigation.tc.faa.gov/public_html/index.html)

<http://www.faa.gov/faadocs.htm>

### **U.S. Department of Agriculture-Wildlife Services**

<http://www.aphis.usda.gov/ws/>

### **Washington State Department of Fish and Wildlife**

<http://www.wa.gov/wdfw/wlm/diversty/soc/soc.htm>

### **Washington State Department of Ecology**

<http://www.ecy.wa.gov/>

## **10.3 - MUNICIPAL AGENCIES**

### **10.3.1 - Animal Control**

#### **PRIMARY**

**King County Animal Control** (206) 296-PETS  
21615 64<sup>th</sup> S.  
Kent, WA 98

#### **SECONDARY**

Seattle Animal Control	206.386.7387
Des Moines Animal Control	206.870.6549
Normandy Park Animal Control	206.248.7600
Renton Animal Control	425.430.7550

### **10.3.2 - Police Departments**

#### **King County Sheriff's Department**

SE 22300 231<sup>st</sup>  
Maple Valley, WA 98038  
(206) 296-3883

#### **City of SeaTac**

17900 International Blvd. S., Suite 401  
SeaTac, WA. 98188  
(206) 241-9100

#### **City of Burien**

14905 6th Ave SW  
Burien, WA 98168  
(206) 296-3333

#### **City of Tukwila**

6200 South Center Blvd  
Tukwila, WA 98188  
(206) 433-1804

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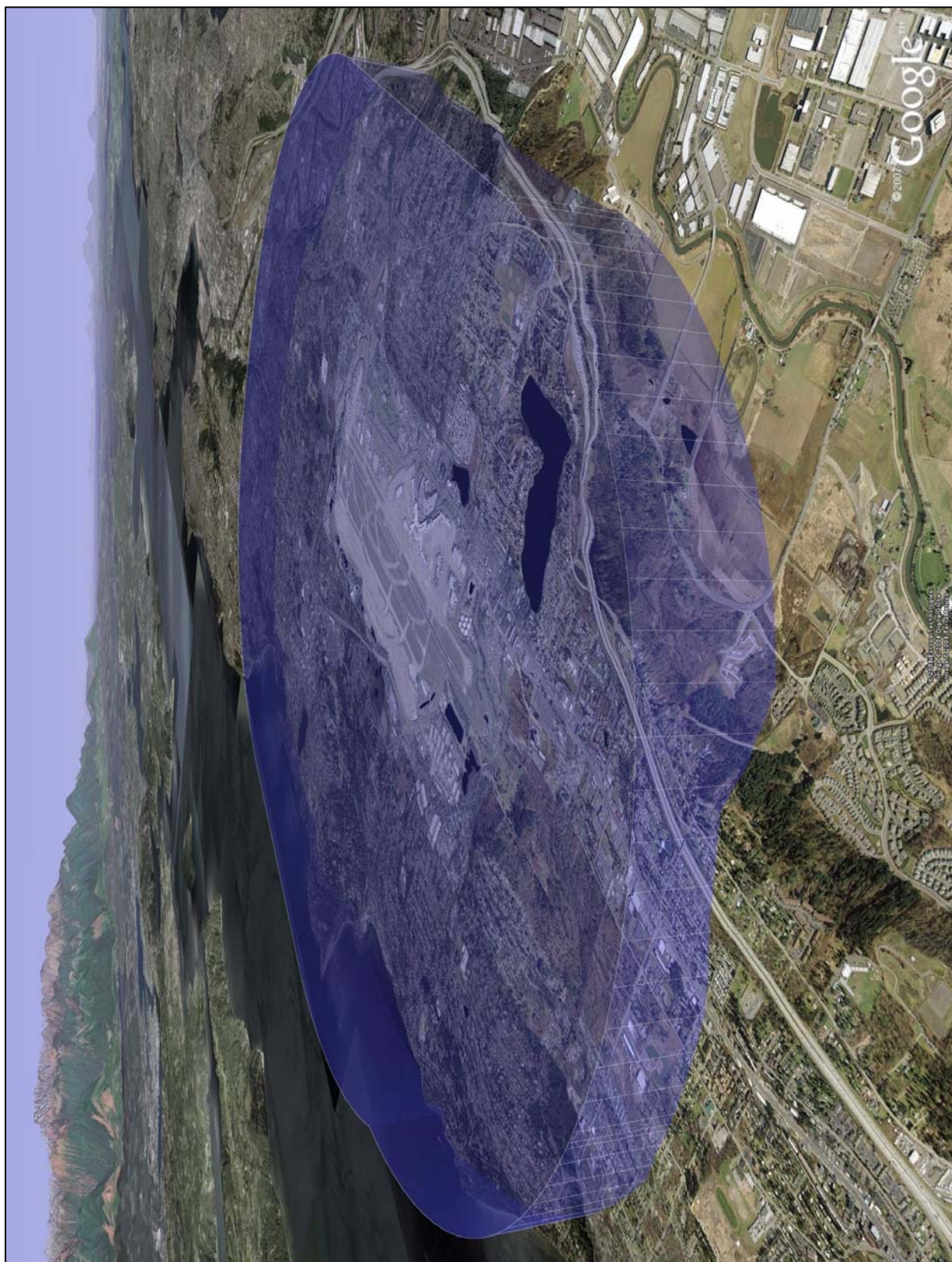


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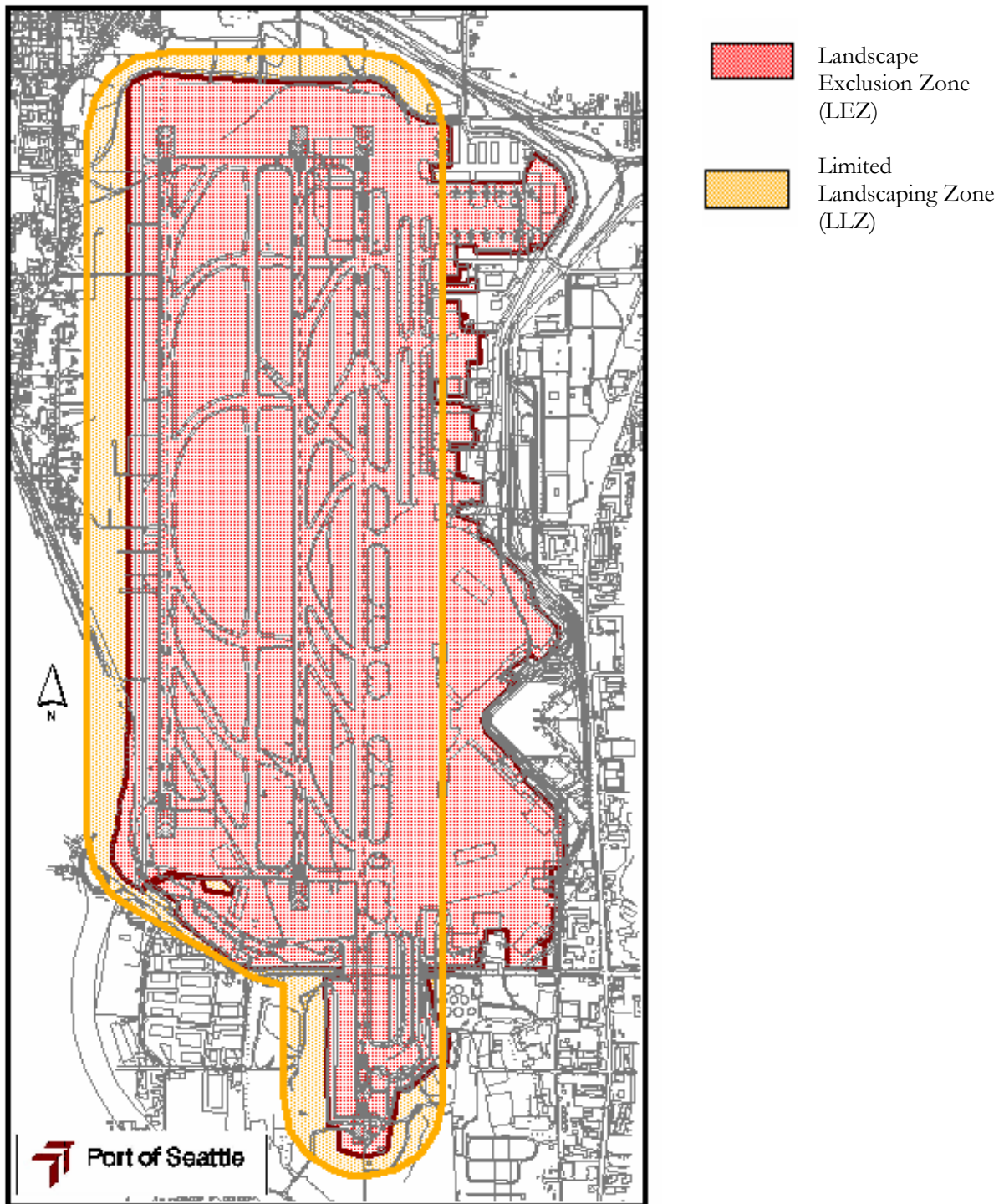
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## Landscaping Zones at SeaTac International Airport



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*The composite raydome was destroyed after this F-111 collided with a Red-tailed Hawk Cannon AFB, New Mexico (Photo courtesy USAF).*

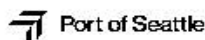
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Revision Date: \_\_\_\_\_

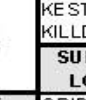
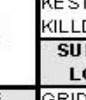




Page of

## DAILY WILDLIFE REPORT

FOR: CONTINUOUS SURVEILLANCE, 3-MINUTE  
SURVEYS, AND SIGNIFICANT EVENTS

DATE		SURVEY, AND SIGNIFICANT EVENT				
		AIR TRAFFIC FLOW				
OBSERVER NAME		SOUTH		NORTH		
		PRECIPITATION		CLOUD COVER		
		TYPE	FORCE	NONE, BUT WET SLIGHT MODERATE HEAVY	0-25 % 26-50% 51-75% 76-100%	FOG
<b>FIRST 3-MINUTE SURVEY or SIGNIFICANT EVENT (Complete Last Section Below)</b>						
TIME (exact)	ANIMAL	TYPE	NUMBER	MAIN BEHAVIOR	MAIN ATTRACTANT	ACTION(S)
<b>WILDLIFE</b> Most Hazardous _____ Location Observed _____ GRID on back _____  Direction _____ Moving Towards _____  	COYOTE	_____	OSPREY	_____	STRUCTURE	Could only observe
	CROW	_____	OWL	_____	CREEK/DITCH	HORN
	DUCK	_____	PIGEON	_____	DETENTION POND	BANGER
	EAGLE	_____	RABBIT	_____	DIRT PILE	DISTRESS CALL
	FALCON	_____	RACCOON	_____	FENCE	SCREAMER
	FLICKER	_____	ROBIN	_____	GOLF COURSE	SHELL CRACKER
	GOOSE	_____	STARLING	_____	GRASS: <input type="checkbox"/> < 8" <input type="checkbox"/> > 8"	SHOTGUN
	GULL	_____	SWALLOW	_____	<input type="checkbox"/> Mowed <input type="checkbox"/> Hydroseed	VEHICLE
	HAWK	_____	OPOSSUM	_____	NAVAID Type:	OTHER
	HERON	_____	OTHER	_____	RAMP	
				<input type="checkbox"/> SIGNIFICANT EVENT (See Below)	RY/TWY	POOR
<b>SURVEYOR'S LOCATION</b>		<b>COMMENTS</b>			ROAD: <input type="checkbox"/> gravel <input type="checkbox"/> paved	FAIR
<b>ALTITUDE</b>					TEMP STAND WATER	GOOD
GRID on back					SHRUB	
AGL					WETLAND	<b>NUMBER KILLED</b>
					WOODS	
					OTHER	
<b>SECOND 3-MINUTE SURVEY or CONTINUOUS SURVEILLANCE OBSERVATION</b>						
TIME (Local)	ANIMAL	TYPE	NUMBER	MAIN BEHAVIOR	MAIN ATTRACTANT	ACTION(S)
<b>WILDLIFE</b> Most Hazardous _____ Location Observed _____ GRID on back _____  Direction _____ Moving Towards _____  	COYOTE	_____	OSPREY	_____	STRUCTURE	Could only observe
	CROW	_____	OWL	_____	CREEK/DITCH	HORN
	DUCK	_____	PIGEON	_____	DETENTION POND	BANGER
	EAGLE	_____	RABBIT	_____	DIRT PILE	DISTRESS CALL
	FALCON	_____	RACCOON	_____	FENCE	SCREAMER
	FLICKER	_____	ROBIN	_____	GOLF COURSE	SHELL CRACKER
	GOOSE	_____	STARLING	_____	GRASS: <input type="checkbox"/> < 8" <input type="checkbox"/> > 8"	SHOTGUN
	GULL	_____	SWALLOW	_____	<input type="checkbox"/> Mowed <input type="checkbox"/> Hydroseed	VEHICLE
	HAWK	_____	OPOSSUM	_____	NAVAID Type:	OTHER
	HERON	_____	OTHER	_____	RAMP	
				<input type="checkbox"/> SIGNIFICANT EVENT (See Below)	RY/TWY	POOR
<b>SURVEYOR'S LOCATION</b>		<b>COMMENTS</b>			ROAD: <input type="checkbox"/> gravel <input type="checkbox"/> paved	FAIR
<b>ALTITUDE</b>					TEMP STAND WATER	GOOD
GRID on back					SHRUB	<b>NUMBER KILLED</b>
AGL					WETLAND	
					WOODS	
					OTHER	
<b>NOTE: THIS SECTION IS FOR DESCRIBING THE SIGNIFICANT EVENT INDICATED ABOVE</b>						
ANIMAL		AIR CRAFT AND AIRLINE		AIRLINE CONTACT		ESTIMATED
Found Dead or Injured		TYPE	TAIL #	FLIGHT #	NAME	COST
Nothing Found (Reported)					PHONE	
Other					EMAIL	
EVENT DESCRIPTION		PART(S) STRUCK/DAMAGED				DOWNTIME
Strike or Possible Strike						
Near Miss by Aircraft						
Neg. Effect on flight or Ops						
Other						
<b>ALSO COMPLETE THE SIGNIFICANT WILDLIFE EVENT CHECKLIST</b>		EFFECT ON FLIGHT		RUNWAY USED		FIRST REPORTED BY
		ABORTED TAKEOFF		34		POS
		PRECAUTIONARY LANDING		R		OPERATIONS
		ENGINE(S) MALFUNCTION		C		MAINTENANCE
		NO EFFECT		16		L
						FAA
						TOWER
						GENERAL AREA
						< 10,000' from SEA
						> 10,000' from SEA
						AIRPORT

**Send pest complaints to: [pest@portseattle.org](mailto:pest@portseattle.org)**

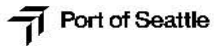
Updated: 06/08/2006

Or Call Biologist # (206) 419-8666

Original Date: \_\_\_\_\_

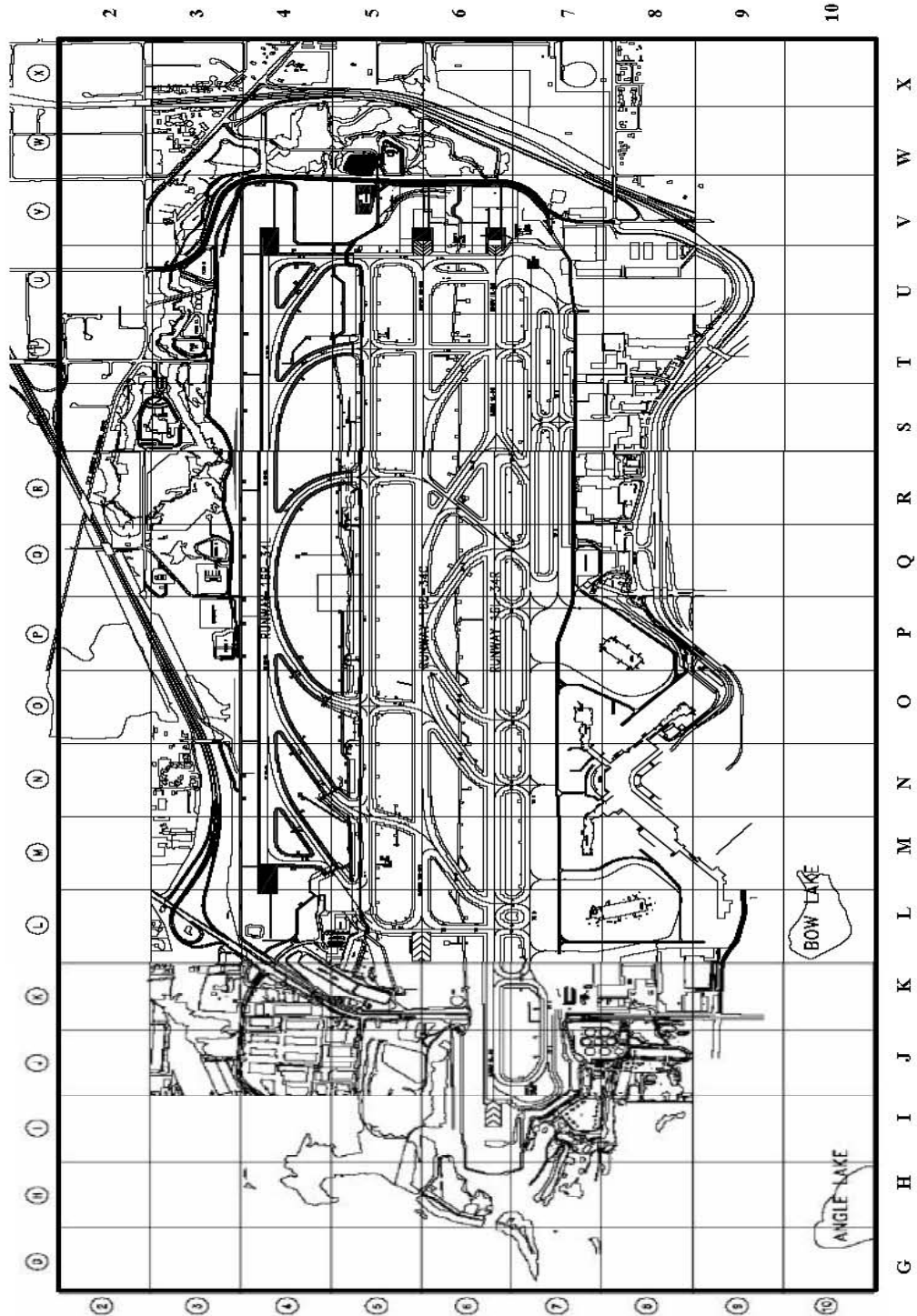
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Revision Date: \_\_\_\_\_



FAX (206) 433-4645

ADDITIONAL COMMENTS



Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_

**Electronic Filing of Bird/Other Wildlife Strikes**<http://wildlife.pr.erau.edu/strikeform/birdstrikeform.html>

BIRD/OTHER WILDLIFE STRIKE REPORT																																																		
Form Approved OMB NO. 2120-0045																																																		
1. * Name of Operator (To Save)	2. Aircraft Make/Model	3. Engine Make/Model																																																
4. Aircraft Registration	5. Date of Incident mm dd yyyy	6. Local Time of Incident <input type="checkbox"/> Dawn <input type="checkbox"/> Dusk <input type="checkbox"/> Hr <input type="checkbox"/> Min <input type="checkbox"/> Day <input type="checkbox"/> Night <input type="checkbox"/> AM <input type="checkbox"/> PM																																																
6A. Flight Number	6B. Wildlife/Bird Remains: <input type="checkbox"/> Collected <input type="checkbox"/> Sent to Smithsonian																																																	
7. * Airport Name/ID (To Save)	8. Runway Used	9. Location if En Route (Nearest Town/Reference & State)																																																
10. Height (AGL) <input type="text"/> ft	11. Speed (IAS) <input type="text"/> kts																																																	
12. Phase of Flight <input type="checkbox"/> A. Parked <input type="checkbox"/> B. Taxi <input type="checkbox"/> C. Take-off Run <input type="checkbox"/> D. Climb <input type="checkbox"/> E. En Route <input type="checkbox"/> F. Descent <input type="checkbox"/> G. Approach <input type="checkbox"/> H. Landing Roll	13. Part(s) of Aircraft Struck or Damaged <table border="1"> <thead> <tr> <th></th> <th>Struck</th> <th>Damaged</th> </tr> </thead> <tbody> <tr><td>A. Radome</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>B. Windshield</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>C. Nose</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>D. Engine #1</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>E. Engine #2</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>F. Engine #3</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>G. Engine #4</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table> Bird(s) Ingested? <input type="checkbox"/> (Check for Yes)		Struck	Damaged	A. Radome	<input type="checkbox"/>	<input type="checkbox"/>	B. Windshield	<input type="checkbox"/>	<input type="checkbox"/>	C. Nose	<input type="checkbox"/>	<input type="checkbox"/>	D. Engine #1	<input type="checkbox"/>	<input type="checkbox"/>	E. Engine #2	<input type="checkbox"/>	<input type="checkbox"/>	F. Engine #3	<input type="checkbox"/>	<input type="checkbox"/>	G. Engine #4	<input type="checkbox"/>	<input type="checkbox"/>	13. (Con't) <table border="1"> <thead> <tr> <th></th> <th>Struck</th> <th>Damaged</th> </tr> </thead> <tbody> <tr><td>H. Propeller</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>I. Wing/Rotor</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>J. Fuselage</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>K. Landing Gear</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>L. Tail</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>M. Lights</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>N. Other</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table> (Specify, if "N. Other" is checked)		Struck	Damaged	H. Propeller	<input type="checkbox"/>	<input type="checkbox"/>	I. Wing/Rotor	<input type="checkbox"/>	<input type="checkbox"/>	J. Fuselage	<input type="checkbox"/>	<input type="checkbox"/>	K. Landing Gear	<input type="checkbox"/>	<input type="checkbox"/>	L. Tail	<input type="checkbox"/>	<input type="checkbox"/>	M. Lights	<input type="checkbox"/>	<input type="checkbox"/>	N. Other	<input type="checkbox"/>	<input type="checkbox"/>
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M. Lights	<input type="checkbox"/>	<input type="checkbox"/>																																																
N. Other	<input type="checkbox"/>	<input type="checkbox"/>																																																
14. Effect on Flight <input type="checkbox"/> None <input type="checkbox"/> Aborted Take-Off <input type="checkbox"/> Precautionary Landing <input type="checkbox"/> Engine Shutdown <input type="checkbox"/> Other (Specify)	15. Sky Condition <input type="checkbox"/> No Cloud <input type="checkbox"/> Some Cloud <input type="checkbox"/> Overcast	16. Precipitation <input type="checkbox"/> Fog <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> None																																																
17. Bird/Other Wildlife Species	18. Number Seen and/or Struck <table border="1"> <thead> <tr> <th>Number</th> <th>Seen</th> <th>Struck</th> </tr> </thead> <tbody> <tr><td>1</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>2 - 10</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>11 - 100</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>more than 100</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </tbody> </table>	Number	Seen	Struck	1	<input type="checkbox"/>	<input type="checkbox"/>	2 - 10	<input type="checkbox"/>	<input type="checkbox"/>	11 - 100	<input type="checkbox"/>	<input type="checkbox"/>	more than 100	<input type="checkbox"/>	<input type="checkbox"/>	19. Size of Bird(s) <input type="checkbox"/> Small <input type="checkbox"/> Medium <input type="checkbox"/> Large																																	
Number	Seen	Struck																																																
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11 - 100	<input type="checkbox"/>	<input type="checkbox"/>																																																
more than 100	<input type="checkbox"/>	<input type="checkbox"/>																																																
20. Pilot Warned of Birds/Wildlife? <input type="checkbox"/> Yes <input type="checkbox"/> No																																																		
21. Remarks (Describe damage, injuries, and other pertinent information)																																																		
DAMAGE/COST INFORMATION																																																		
22. Aircraft time out of service: <input type="text"/> hours	23. Estimated cost of repairs or replacement (US \$) \$ <input type="text"/>	24. Estimated other costs (US \$) (e.g., revenue loss, fuel, aircraft inspection, crew lodging or rescheduling, etc.) \$ <input type="text"/>																																																
<input checked="" type="checkbox"/> Check to save submitter info below (and optionally, Operator and/or Airport) and insert on future submittals. (Uncheck to stop saving)																																																		
Reported by STEVE OSMEK	Title WILDLIFE BIOLOGIST	Date 1/24/08 (mm/dd/yy)																																																
Phone 206.419.8666	Email OSMEK.S@PORTSEATTLE																																																	

FAA Form 5200-7 (Electronic) Revised 10-20-2007

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_



## Ever Since Aviation...



1908 FIRST STRIKE  
Orville Wright chased  
and struck blackbirds



1912 FIRST MORTALITY  
Calbraith Rogers after  
accidentally striking a gull

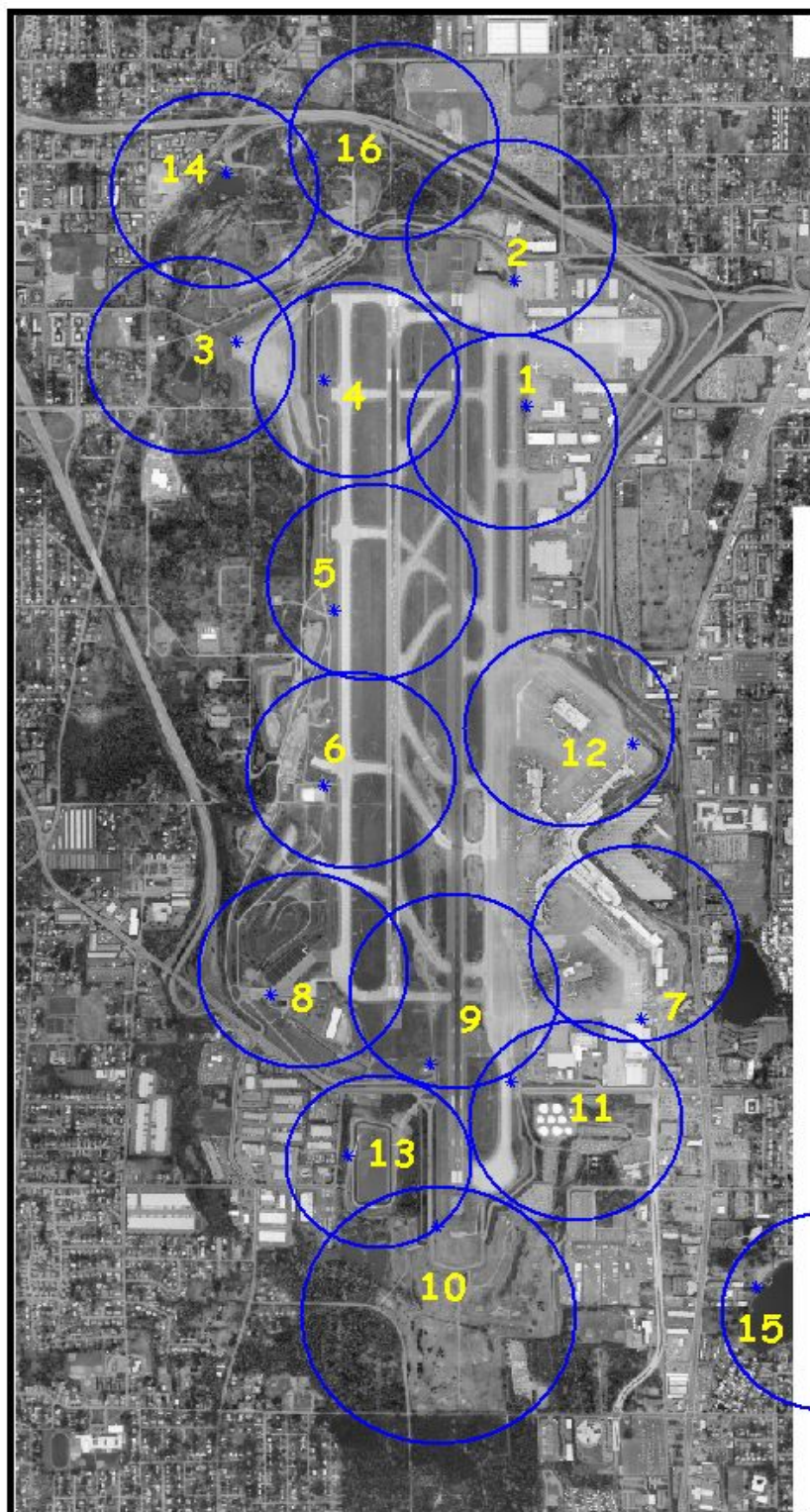
Part of Seattle

2005 Training

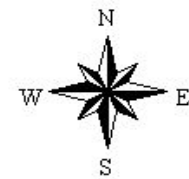
Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_



## General Viewing Areas for 16 Pt Surveys



\* Survey Point  
Location

○ Approximate  
View Area

3 MAY 2004

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_





The pilot of this Cessna 172 made a Mayday call to nearby Air Traffic Control Tower in Texas after hitting a bird (likely a vulture) with the left wing at 800 feet AGL on 8 July 2003. The pilot attempted to make an emergency landing in a field but lost control and crashed, killing himself and his passenger. Worldwide, over 157 people have been killed by wildlife strikes since 1990. (Photo by FAA)

Source: Cleary E.C. and R.A. Dolbeer. 1999. *Wildlife Hazard Management at Airports*

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Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_





Key	
Tyee	
Lora Lake	
Lake Reba	
Vacca Farms	
Nursery	
SR509	
A17a	
A17b	

Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_

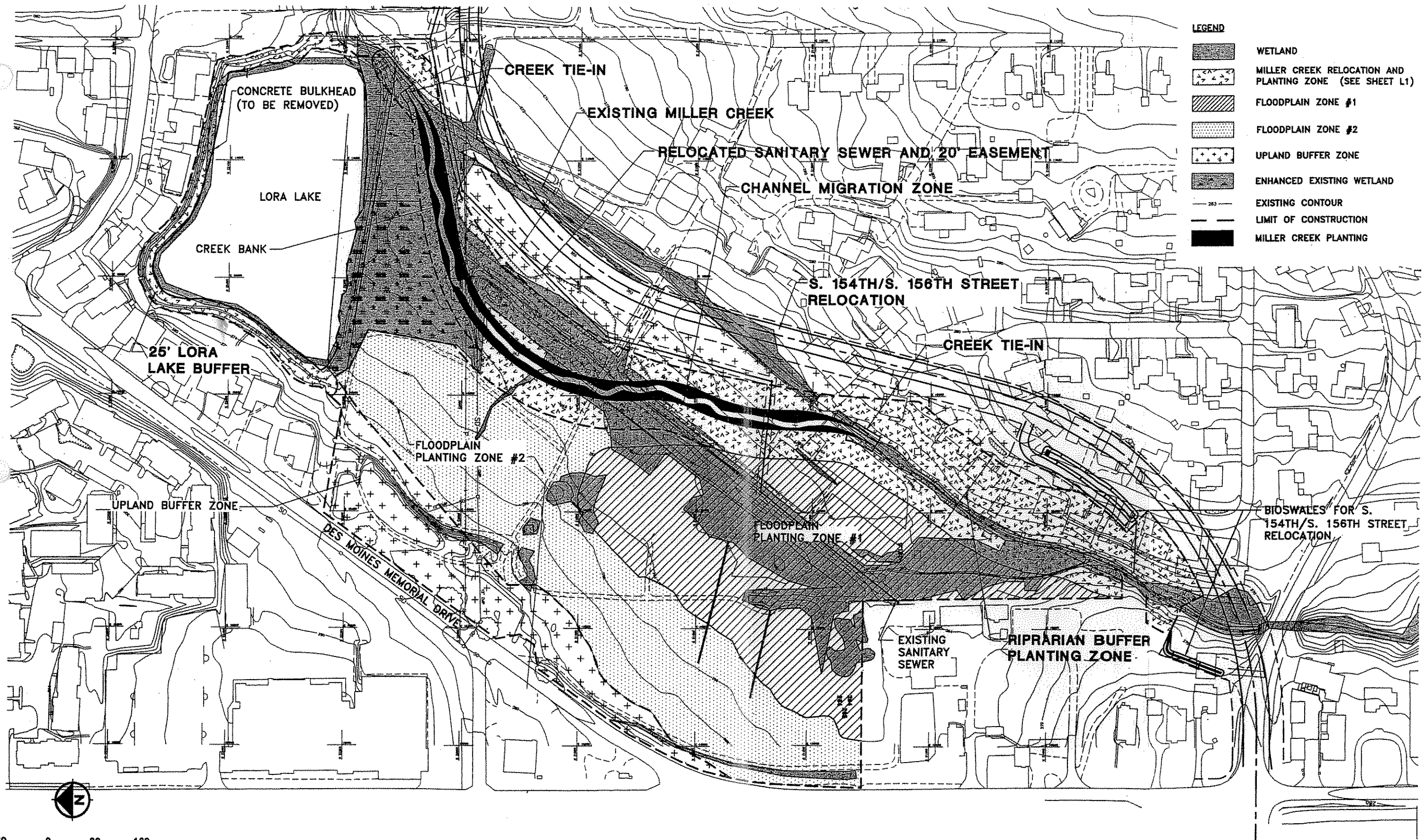


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Revision Date: \_\_\_\_\_



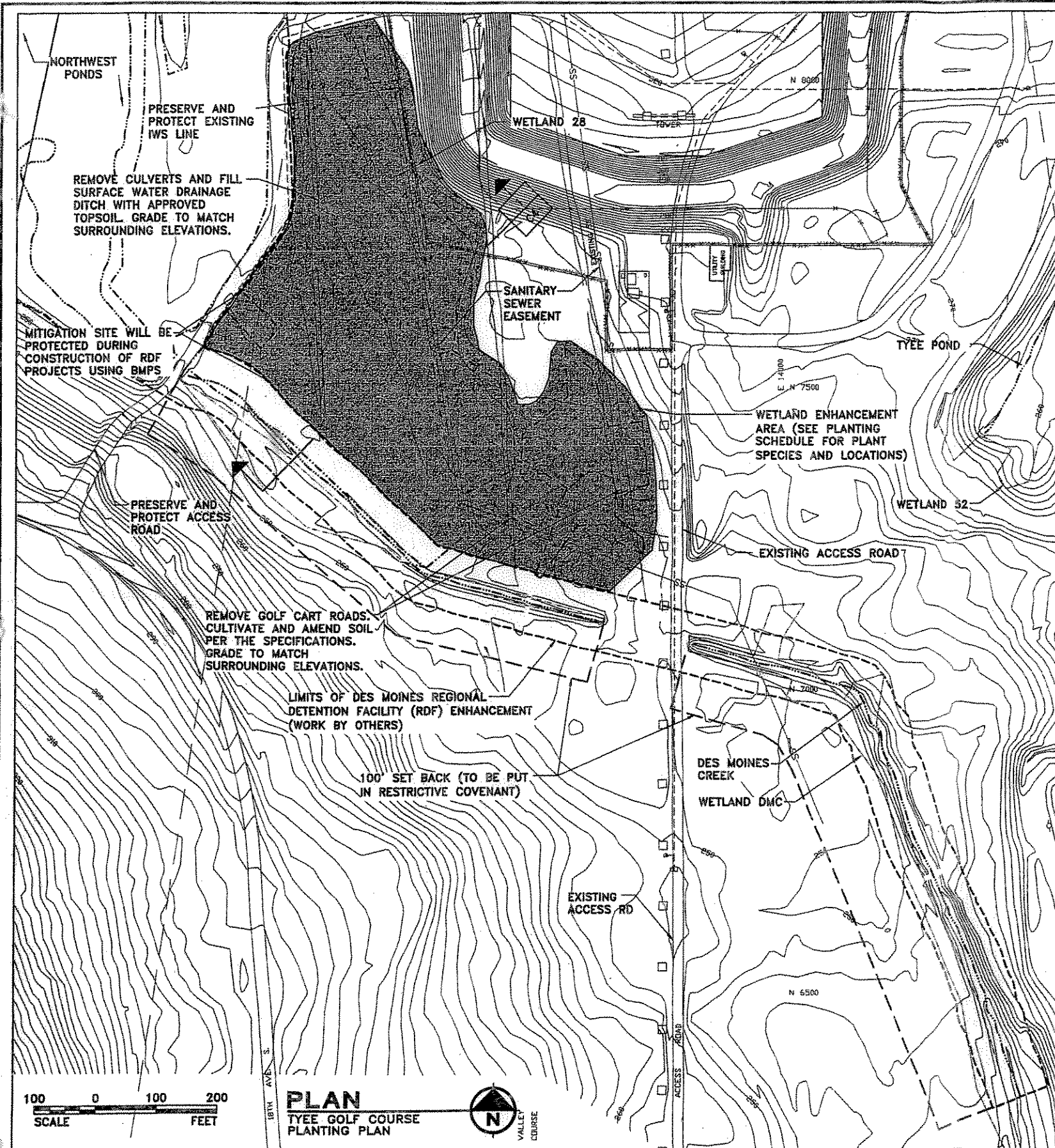


AGENCY REVIEW  
NOT FOR CONSTRUCTION

CALL 48 HOURS BEFORE YOU DIG 1-800-424-5555	<b>Parametrix, Inc.</b> 5808 Lk. Washington Blvd. NE Kirkland, WA 98033 Ph: (425) 822-8880 "Quality Service Through Employee Ownership"	PROJECT SHEET/ARCH P. FENDT DESIGNED BY M. LOUTHER DRAWN BY C. COX/P. TOGHER SCALE 1"=80' DATE AUGUST 2000 REVISIONS BY		REVISIONS						PROJECT ENGINEER		<b>Port of Seattle SEA-TAC INTERNATIONAL AIRPORT</b> PROJECT: MILLER CREEK RELOCATION WHMP SHEET TITLE: MILLER CREEK RELOCATION AND FLOODPLAIN ENHANCEMENT	WORK ORDER NO. 100051 CONSULTANT NO. WHMP PORT OF SEATTLE NO. STIA-9805-C1.1A
		NO.	DATE	BY	DESCRIPTION	APP'D	NO.	DATE	BY	DESCRIPTION	APP'D		

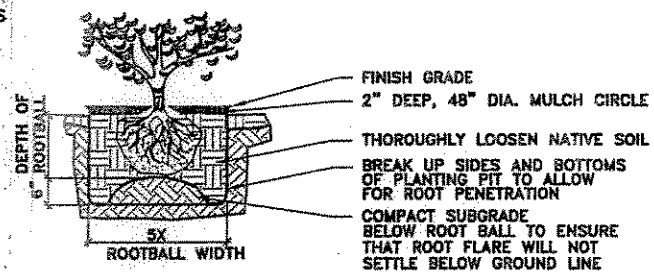
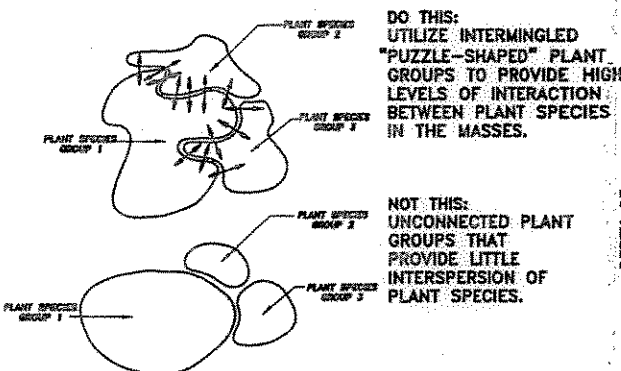






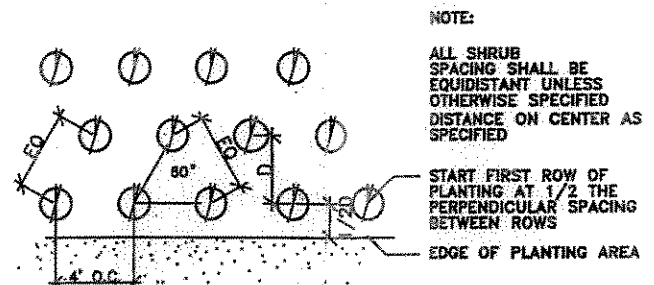
NOTES:

1. PLANT QUANTITIES STATED IN THE PLANTING SCHEDULE ARE FOR CONTRACTOR'S CONVENIENCE ONLY. CONTRACTOR IS RESPONSIBLE FOR ENSURING PLANT COVERAGE STATED IN THE PLANT SCHEDULE.
2. PRESERVE AND PROTECT ALL TREES AND SHRUBS NOT DESIGNATED FOR REMOVAL. PROVIDE, ERECT, AND MAINTAIN BARRICADES NECESSARY TO PREVENT ACCESS TO AREA WITHIN DRIP LINES OF EXISTING TREES. ALLOW NO VEHICULAR AND PEDESTRIAN TRAFFIC, OR STACKING AND/OR STORAGE OF CONSTRUCTION MATERIALS WITHIN BARRICADES.
3. CONTRACTOR SHALL LAY OUT A 10,000 S.F. TEST PLOT, IN WHICH THE POSITIONS OF ALL PLANTS SHALL BE STAKED WITH FLAGS THAT ARE COLOR CODED TO REPRESENT SPECIFIC SPECIES. LAYOUT SHALL BE INSPECTED AND APPROVED BY ENGINEER PRIOR TO COMMENCEMENT OF PLANTING. APPROVED STAKING SHALL SERVE AS THE PLANT LAYOUT STANDARD FOR THE REMAINDER OF THE PLANTING AREA.
4. SHRUB MASSES SHALL CONSIST OF MULTIPLE SINGLE-SPECIES GROUPS (SEE DETAIL 1). CONTRACTOR SHALL ENSURE THAT THESE SINGLE-SPECIES GROUPS HAVE A VARIETY OF SIZES AND SHAPES, AND THAT SHRUB MASSES HAVE A VARIETY OF SPECIES. SEE PLANTING SCHEDULE FOR NUMBERS OF PLANTS IN SINGLE-SPECIES GROUPS.
5. CONTRACTOR SHALL COMPLY WITH ARCHAEOLOGICAL MONITORING REQUIREMENTS, AND RESTRICTIONS RESULTING FROM CONTACT WITH ARCHAEOLOGICALLY SIGNIFICANT OBJECTS (SEE SPECIFICATIONS).
6. CONTRACTOR SHALL HYDROSEED ALL AREAS DISTURBED BY WORK, USING HERBACEOUS WETLAND SEED MIX (SEE SPECIFICATIONS). RE-SEED ALL AREAS THAT ARE DISTURBED BY SUBSEQUENT WORK.
7. AN AUTOMATIC IRRIGATION SYSTEM WILL BE PROVIDED FOR ALL PLANTING AREAS.



DETAIL 1  
SHAPES OF PLANTING MASSES  
NTS

DETAIL 2  
SHRUB PLANTING  
(TYPICAL)



DETAIL 3  
TRIANGULAR SHRUB SPACING  
(TYPICAL)

PLANT SCHEDULE				
Symbol	Botanical Name	Size	Quantity	Remarks
	<i>Physocarpus capitatus</i> /Pacific ninebark	1 gal.	x	CONTAINER. ROOTING TO SIDES AND BOTTOM OF CONTAINER. 5' O.C. SPACING TYP. LOCATE PLANTS IN SINGLE-SPECIES GROUPS OF 7 TO 12.
	<i>Rosa pisocarpa</i> /Clustered rose	1 gal.	x	
	<i>Salix hookeriana</i> /Hookers willow	1 gal.	x	
	<i>Salix scouleriana</i> /Scoulers willow	1 gal.	x	
	<i>Salix sitchensis</i> /Sitka willow	1 gal.	x	
	<i>Spiraea douglasii</i> /Hardhack spiraea	1 gal.	x	

AGENCY REVIEW  
NOT FOR CONSTRUCTION

CALL 48 HOURS BEFORE YOU DIG  
1-800-424-5555

**Parametrix, Inc.**  
5806 Lk. Washington Blvd. NE  
Kirkland, WA 98033  
Ph: (425) 822-8880

**PROJECT ENGINEER**  
P. FENOT  
**DESIGNED BY**  
J. KELLEY  
**DRAWN BY**  
C. COX/P. TOGHER  
SCALE  
1"=100'  
DATE  
AUGUST 2000  
CHECKED BY  
APPROVED BY

REVISIONS			
NO.	DATE	BY	DESCRIPTION

**PROJECT ENGINEER**  
DESIGNED BY  
DRAUGHTSMAN  
DATE  
CHECKED BY  
APPROVED BY

**Port of Seattle**  
**SEA-TAC INTERNATIONAL AIRPORT**  
PROJECT  
**TYEE VALLEY GOLF COURSE**  
**WETLAND ENHANCEMENT - WHMP**  
SHEET TITLE  
**PLANTING PLAN**

WORK ORDER NO.  
CONSULTANT'S NO.  
WHMP  
PORT OF SEATTLE NO.  
S714-XXXY-C2A

## **APPENDIX F**

### **Section 401 and Section 404 Permit Conditions**

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Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_



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Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_



STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47600 • Olympia, Washington 98504-7600  
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

June 7, 2004

**REGISTERED MAIL**

Port of Seattle, AV/ENV  
Attn: Ms. Elizabeth Leavitt  
P.O. Box 68727  
Seattle, WA 98168

Dear Ms. Leavitt:

Re: Water Quality Certification for U.S. Army Corps of Engineers Public Notice 1996-4-02325 (Amended-2); Construction of a Third Runway and related projects at the Seattle-Tacoma International Airport (STIA) in the Miller, Walker, and Des Moines Creek watersheds and in wetlands at the Seattle-Tacoma International Airport, located within the vicinity of the city of SeaTac, King County, Washington; and in wetlands at the mitigation site in Auburn, King County, Washington.

The public notice from the U.S. Army Corps of Engineers (Corps) for proposed work has been reviewed. On behalf of the state of Washington, we certify that the work proposed in the Port of Seattle's (the Port's) revised Joint Aquatic Resource Permit Application (JARPA) dated October 25, 2000, the Corps' public notice and the Department of Ecology's (Ecology's) public notice complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, as amended, and other appropriate requirements of state law. This letter also serves as the state response to the Corps. This letter also serves as notification that Ecology has rescinded Order Number 1996-4-02325 (Amended-1) issued on September 21, 2001 and replaced it with Order Number 1996-4-02325 (Amended-2) issued on June 7, 2004. This order was amended to incorporate changes required by the Washington Supreme Court through its decision in *Port of Seattle, et al. v. Pollution Control Hearings Board, et al.*, \_\_\_ P.3d \_\_\_, 2004 WL 1075236 (May 14, 2004).

Pursuant to Section 307(c)(3) of the Coastal Zone Management Act of 1972 as amended, Ecology concurs with the Port's certification that this work is consistent with the approved Washington State Coastal Zone Management Program. This concurrence is based upon the Port's compliance with all applicable enforceable policies of the Coastal Zone Management Program, including Section 401 of the Federal Water Pollution Control Act.



Work authorized by this certification is limited to the work described in the October 25, 2000, JARPA, the Corp's Public Notice, and the plans submitted by the Port to Ecology for review and written approval.

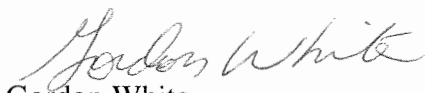
This certification shall be withdrawn if the Corps does not issue a Section 404 permit. It shall also be withdrawn if the project is revised in such a manner or purpose that the Corps or Ecology determines the revised project must obtain new authorization and public notice. The Port will then be required to reapply for state certification under Section 401 of the Federal Clean Water Act.

This certification is subject to the conditions contained in the enclosed Order and to the water quality and aquatic resource related conditions of the following permits and approvals:

- The Hydraulic Project Approval (HPA) issued by the Washington State Department of Fish & Wildlife (WDFW).
- NPDES permit #WA-002465-1, issued by the Department of Ecology on September 4, 2003.
- NPDES General Stormwater Permit for Construction Activity #SO3-00491 issued by the Department of Ecology on April 4, 2001.

If you have any questions, please contact Ann Kenny at (425) 649-7128. Written comments can be sent to her at the Department of Ecology, Northwest Regional Office, 3190 160<sup>th</sup> Avenue SE, Bellevue, Washington, 98008-5452. The enclosed Order may be appealed by following the procedures described in the Order.

Sincerely,



Gordon White  
Program Manager  
Shorelands and Environmental Assistance Program

GW:AK  
Enclosure

cc: Michelle Walker, Corps of Engineers  
Keith Gordon, Corps of Engineers  
Larry Fisher, WDFW  
Tom Sibley, NMFS  
Nancy Brennan-Dubbs, USFWS  
Joan Cabreza, EPA  
Stuart Chreighton Airport Communities Coalition



**IN THE MATTER OF GRANTING A  
WATER QUALITY CERTIFICATION  
TO:**

the Port of Seattle, in accordance with 33  
U.S.C. 1341 FWPCA § 401, RCW  
90.48.260  
and WAC 173-201A.

**ORDER #1996-4-02325 (Amended -2)**

Construction of a Third Runway and related projects. Components of the project include construction of a 8,500-foot-long third parallel runway with associated taxiway and navigational aids, establishment of standard runway safety areas for existing runways, relocating S. 154<sup>th</sup> Street north of the extended runway safety areas and the new third runway, development of the South Aviation Support Area and the use of on-site borrow sources for the third runway embankment.

TO: Port of Seattle, AV/ENV  
Attn: Elizabeth Leavitt  
P.O. Box 68727  
Seattle, WA 98168

The Port of Seattle (Port) requested a water quality certification from the state of Washington for the above-referenced project pursuant to the provisions of 33 U.S.C. 1341 (FWPCA § 401). The request for certification was made available for public review and comment through the U.S. Army Corps of Engineer's Second Revised Public Notice No. 1996-4-02325 dated December 27, 2000, as amended by the Corps' Amendment and Erratum to the Second Revised Public Notice dated January 17, 2001. Ecology issued a 401 certification for this project on August 10, 2001. Ecology later decided to amend that certification. Accordingly, Ecology rescinded Order Number 1996-4-02325 and replaced it in its entirety with Order Number 1996-4-02325 (Amended-1).

The amended 401 certification was appealed to the Pollution Control Hearings Board, which added 16 conditions. A further appeal was then taken to the Washington Supreme Court. In a decision dated May 14, 2004, the Washington Supreme Court affirmed some of the Pollution Control Hearings Board's conditions, overturned others, and modified certain provisions of the amended 401 certification. Ecology hereby rescinds Order Number 1996-4-02325 (Amended-1) in its entirety and replaces it, in its entirety, with Order Number 1996-4-02325 (Amended-2) to incorporate changes required by the Washington Supreme Court's decision.

The Third Runway site and related Master Plan Update projects and on-site mitigation are located in Sections 4, 5, and 9, Township 22N, Range 4E and Sections 20, 21, 28, 29, 32, 33, Township 23 N, Range 4E in King County. Offsite mitigation will be located in Section 31, Township 22N, Range 5E in King County. The project areas, on-site mitigation and the proposed offsite mitigation are located within Water Resource Inventory Area 9. The projects covered by this Order are described in detail in the December 27, 2000 Public Notice issued by the U.S. Army Corps of Engineers, the October 25, 2000 Joint Aquatic Resource Permit Application (JARPA) and in the plans approved by Ecology as a part of this Order.

For purposes of this Order, the term "Port" shall mean Port of Seattle and its agents or

contractors.

Work authorized by this Order is limited to the work described in the October 25, 2000, JARPA, as amended, unless modified by this Order or by conditions contained in other permits sought for the Master Plan Update Improvement projects.

#### **AUTHORITIES:**

In exercising authority under 33 U.S.C. 1341 and RCW 90.48.260, Ecology has investigated this application pursuant to the following:

- A. Conformance with applicable water quality-based, technology-based, and toxic or pretreatment effluent limitations as provided under 33 U.S.C. Sections 1311, 1312, 1313, 1316, and 1317 (FWPCA Sections 301, 302, 303, 306, and 307);
- B. Conformance with the state water quality standards as provided for in Chapter 173-201A WAC, and authorized by 33 U.S.C. 1313 and Chapter 90.48 RCW, and with other appropriate requirements of state law; and,
- C. Conformance with the requirement to use all known, available and reasonable methods to prevent and control pollution of state waters as provided by RCW 90.48.010.

#### **WATER QUALITY CERTIFICATION CONDITIONS:**

In view of the foregoing and in accordance with 33 U.S.C. 1341, RCW 90.48.260 and Chapter 173-201A WAC, by this Order water quality certification is granted to the Port, subject to the following conditions:

##### **A. Water Quality Standard Conditions:**

###### **1. Water Quality Criteria**

Des Moines Creek (WA-09-2000), Miller Creek (WA-09-2005) and Walker Creek (1223370474523) are Class AA waters of the state. Certification of this proposal does not authorize the Port to exceed applicable state water quality standards (173-201A WAC) or sediment quality standards (173-204 WAC). Water quality criteria contained in WACs 173-201A-030(1) and 173-201A-040 shall apply to this project, unless otherwise authorized by Ecology. This Order does not authorize temporary exceedances of water quality standards beyond the limits established in WAC 173-201A-110(3). Furthermore, nothing in this Order shall absolve the Port from liability for contamination and any subsequent cleanup of surface waters or sediments occurring as a result of project construction or operations.

Des Moines Creek has been identified on the current FWCPA Section 303(d) list as

exceeding state water quality standards for fecal coliform. This project shall not result in further exceedances of this standard.

2. Instream/Shoreline Work Monitoring Plan

- a) The Port shall submit a monitoring plan for each in-water or shoreline construction project. The monitoring plan shall be submitted to Ecology for review and approval at least thirty (30) days prior to the start of construction. No construction shall begin until the Port receives written approval of the monitoring plan from Ecology.
- b) All monitoring will be reviewed for compliance with WAC 173-201A.
- c) Port staff or contractors qualified to monitor for water quality compliance shall be on-site during project construction to carry out monitoring and inspect erosion and sedimentation control measures in order to ensure that water quality standards are not exceeded.
- d) In the monitoring plan, the Port shall demonstrate to Ecology that any mixing zone is minimized in conformance with WAC 173-201A-100(6).
- e) At a minimum, the monitoring plan shall include the measurement of turbidity and pH at an agreed point upstream of the point of in-water work or shoreline work and an agreed downstream point not to exceed 100 feet. The monitoring method shall be by a portable turbidimeter and a pH meter following the prescribed maintenance, operating, and calibration procedures in the instrument's instruction manuals. Alternatively, a grab sample can be analyzed by a laboratory accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 173-50 WAC.
- f) If a visual sheen is observed the Port shall sample for oil and grease.

The Minimum Detection Level (MDL) for oil and grease is 0.2 mg/L using trichlorotrifluoroethane extraction and gravimetric analysis using EPA Method 413.1. The quantitation level (QL) for oil and grease is 1.0 mg/L (5 x MDL). An equivalent method is Method 1664 using normal hexane (n-hexane) as the extraction solvent in place of 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113; Freon-113). An equivalent method is total petroleum hydrocarbons with a MDL of 0.1 mg/L using Gas Chromatography and Flame Ionization Detector (FID) and Method WTPH-Dx Diesel (WTPH-D) from the Washington State Department of Ecology Method WTPH-D. The quantitation level (QL) for TPH-Dx is 0.5 mg/L (5 x MDL).

- g) If monitoring indicates turbidity standards are not being met at the boundary of the mixing zone, measures shall immediately be taken to reduce turbidity rates, such as slowing the rate of work, placement of additional sediment curtains, etc. A field log in



which the results from the turbidity sampling have been recorded shall be maintained at the project site. The field log shall be made available to Ecology staff upon request.

h) Monitoring results shall be submitted every other month to Ecology's Federal Permit Manager, SeaTac Third Runway.

**B. Permit Duration:**

1. This Order shall be valid during construction of the project. The following provisions of this Order shall be valid during long-term operation and maintenance of the project:
  - a) In Condition D, Wetland, Stream and Riparian Mitigation, as follows: The mitigation areas to be protected by restrictive covenants, and the Final Natural Resource Mitigation Plan as amended, shall remain in effect in perpetuity.
  - b) In Condition D(7), provisions regarding wetland, stream, and riparian mitigation monitoring and reporting shall remain in effect as specified therein.
  - c) In Condition E (3), the Surface Water and Ground Water Monitoring plan shall remain in effect as specified in that plan but in no event for a duration less than eight (8) years from the conclusion of construction, and, should monitoring reveal exceedences, Ecology shall further extend the period of monitoring.
  - d) In Condition F (1), the plan to monitor potential contaminant transport to soil and groundwater via subsurface utility lines shall remain in effect as specified in that plan but in no event for a duration less than eight (8) years from the conclusion of construction, and, for as long as there are contaminants in the AOMA.
  - e) In Condition I, Conditions for Mitigation of Low Flow Impacts, as follows: The low streamflow facilities, and the revised low streamflow plan as amended, shall remain in effect in perpetuity.
  - f) In Condition J, Operational Stormwater Requirements, as follows: Those provisions of this condition, including the Comprehensive Stormwater Management Plan, that are incorporated into and superceded by any future Ecology-approved NPDES permit for the Seattle-Tacoma International Airport (STIA), shall be superceded as determined in that permit. Any conditions not incorporated into a future Ecology-approved NPDES permit for STIA shall remain in effect as provided in this condition.
2. The Port shall reapply with an updated JARPA if **seven years** elapse between the date of the issuance of this Order and completion of the project construction and/or discharge for which the federal license or permit is being sought.

June 7, 2004

3. The Port shall submit an updated application to Ecology if the information contained in the October 25, 2000 JARPA is altered by subsequent submittals to the federal agency and/or state agencies. Within 30 days of receipt of an updated application Ecology will determine if a modification to this Order is required.
4. Any future construction-related activities that could impact waters of the state at this project location, emergency or otherwise, that are not defined in the October 25, 2000 JARPA, this Order, or have not been approved in writing by Ecology, are not authorized by this Order. Such proposed actions shall be reviewed with Ecology for its written approval prior to implementation if the activity requires §401 certification or is otherwise within Ecology's statutory authorization.

**C. Notification and Reporting Requirements:**

1. Notification shall be made to Ecology's Federal Permit Manager, SeaTac Third Runway at 425-649-4310, 425-649-7098 (Fax), mail: 3190 160<sup>th</sup> Avenue SE, Bellevue, WA 98008 or by e-mail at aken461@ecy.wa.gov for the following activities:
  - a) at least thirty (30) days prior to the pre-construction meeting to review environmental permits and conditions,
  - b) at least ten (10) days prior to starting construction of each of the projects identified in Table A-3 (Comprehensive Stormwater Management Plan, Volume 2) and each of the mitigation sites identified in the Natural Resource Mitigation Plan, and
  - c) within seven (7) days after the completion of construction of each of the projects identified in Table A-3 (Comprehensive Stormwater Management Plan, Volume 2) and each of the mitigation sites identified in the Natural Resource Mitigation Plan.

**NOTE:** The required notifications shall include the Port's name, project name, project location, the number of this Order, the name of contractor and any subcontractor, contact and contact's phone number.

2. The Port shall ensure that all appropriate Project Engineer(s) and the Lead Contractor(s) at the project site and/or mitigation sites have read and understand relevant conditions of this Order and all permits, approvals, and documents referenced in this Order.
  - a) The Port shall provide to Ecology a signed statement, **Attachment A**, from each Project Engineer(s) and Lead Contractor(s) that they have read and understand the conditions of this Order and the above-referenced permits, plans, documents and approvals.
  - b) These statements shall be provided to Ecology no less than seven (7) days before each

Project Engineer or Lead contractor begins work at the project or mitigation sites.

3. All reports, plans, or other information required to be submitted by this Order shall be submitted in triplicate to Ecology's Federal Permit Manager, SeaTac Third Runway, at 3190 160<sup>th</sup> Avenue SE, Bellevue, WA 98008-5452.
4. Documents required to be submitted to Ecology for review and/or approval by this Order shall be submitted to Ecology by the time specified in this order. Failure to submit documents by the required time may result in the revocation of this Order. The Port may, on a case-by-case basis, submit a written request for an extension of the specified submittal deadline for a document. Ecology will consider the reasonableness of the request for an extension and may grant an extension for a period of time it deems appropriate. **Ecology will provide any such extension to the Port in writing only.**

**No document, report or plan required by this Order shall be deemed approved until the Port receives written verification of approval from Ecology.**

**D. Wetland, Stream and Riparian Mitigation:**

1. Required Mitigation: Mitigation for this project shall be completed as described in the following documents with the following additions and clarifications:
  - the Final Natural Resource Mitigation Plan (NRMP), Master Plan Update Improvements, STIA, dated December 2000 (Parametrix, Inc.).
  - Appendixes A-E, Design Drawings, Natural Resource Mitigation Plan, STIA, dated December 2000 (Parametrix, Inc.).
  - the Revised Grading and Planting Plan for the Auburn Wetland Mitigation site dated June 28, 2001 (Parametrix, Inc.).
  - the revised NRMP performance standards found in Tables 4.2-1, 4.2-2, 5.1-7, 5.2-3, 5.2-8, 5.2-12, 5.2-16, 5.3-2, 5.3-6, and 7.7-1 received July 31, 2001 (Parametrix, Inc.).
  - the revised Borrow Site Three plan sheets and drawings dated June 2001 and received by Ecology on June 18, 2001 (Hart Crowser).

The Port shall amend and/or clarify the documents identified in Condition D.1 as follows:

- a) The Port shall increase the duration of monitoring from ten (10) to fifteen (15) years.
- b) Table 4.2-1 of the NRMP (July 31, 2001) outlines the performance standards for vegetation cover by vegetation zone and monitoring year. A note shall be added to the table that states: "Invasive plant species cover will be monitored during all monitoring years."



- c) In addition to the non-native invasive species listed in Table 4.2-2 of the NRMP (July 31, 2001), hedge bindweed (*Convolvulus sepium*), giant knotweed (*Polygonum sachalinense*) and evergreen blackberry (*Rubus laciniatus*) shall be monitored and controlled in the mitigation sites.
- d) All performance standards addressing cover of non-native plants shall read:  
“Cover of non-native invasive species will be no greater than 10% in any year in newly planted or enhanced areas.”
- e) Table 5.1-7 of the NRMP (July 31, 2001) states that shade cloth will be placed over the new channel. The Port shall provide a map of the location for the shade cloth, details on how it will be installed, and a schedule of installation and removal.
- f) The Port shall provide Ecology with written documentation of the implementation of any of the contingency measures and adaptive management measures set forth in the NRMP. Temporary erosion and sedimentation measures approved by Ecology shall remain in effect for all adaptive management measures or contingency measures implemented. Any problems identified throughout the mitigation sites shall be immediately corrected. Implementation of corrective actions shall be done within the confines of the contingency measures identified in the NRMP. All contingency measures shall be implemented in a manner such that they do not exceed state water quality standards.
- g) The Port shall monitor hydrologic conditions of all wetlands downslope of the Third Runway embankment in the Miller, Walker and Des Moines Creek sub-basins. Hydrologic monitoring using piezometers and shallow hand dug soil pits in undisturbed wetlands downslope of the Third Runway embankment shall be conducted with sufficient frequency to determine wet season trends. The Port shall immediately begin conducting twice-monthly hydrologic monitoring during the wet season, November through May, and shall continue such monitoring for at least three (3) years after completion. Maps of sample locations and vegetation in the surrounding areas, observation of stressed vegetation, any adaptive management implemented in the surrounding areas, comparison to baseline data, and conclusions shall be documented and submitted to Ecology on a monthly basis during that period. The performance standard for wetlands is modified so that the Port matches the hydroperiods of the wetlands pre and post project, in order to assure the long-term maintenance and perpetuation of wetland characteristics, such as standing or flowing water, wetland resources, and wetland functions. At the end of each water year, the Port shall complete a trends analysis with proposed contingency measures identified and a schedule for completion of proposed contingency measures.

- h) Existing wetland and mitigated wetland boundaries (including all areas down slope of the Third Runway embankment, Vacca farm, the borrow sites, and the Auburn mitigation site) shall be delineated at years five (5), ten (10), and fifteen (15). A licensed survey crew shall survey the wetland points established. The delineation map and comparisons to previous delineation maps shall be furnished to Ecology by December 31st for each of the years in which a delineation is conducted. If the delineation shows the wetland boundaries have decreased then additional in-basin mitigation shall be required by Ecology.
- i) Final performance standards for the replacement drainage channel shall read: "Construct the replacement channel to convey all storm events equal to or less than the 100-year, 24-hour design storm and seepage water collected by the embankment drains layer and adjacent areas." (Revised Performance Standards, Table 5.2-12 NRMP)
- j) Revised Table 5.2-12 of the NRMP (July 31, 2001) proposes a performance standard that monitors the change in plant species in undisturbed wetlands, where the hydrology is being replaced through inputs from the replacement drainage channel. Emergent non-invasive plants provide a better indicator for general plant species trends over time than trees and shrubs because typically their root structures are shallower, and subsequently respond to hydrologic changes more quickly. The Port shall amend the monitoring condition in Table 5.2-12 to read: "Wetland indicator status (WIS) of the dominant noninvasive plant species shall not differ from pre-project conditions during or at the end of the monitoring period. Each vegetative strata (trees, shrubs and emergents) shall be assessed separately, and have separate conclusions. Statistically valid sampling procedures will be employed to monitor these potential changes, in all areas where there is a potential to change the post construction hydrology (down slope of the embankment, and the borrow sites). WIS status of the vegetation will be calculated as described in the 1987 USACE or Washington State Department of Ecology delineation manuals."
- k) In all areas where soil saturation is being monitored the performance standards shall include the following conditions: "Other wetlands with predominantly mineral soils shall have groundwater within the upper 10 inches from at least March to mid-April in years of normal rainfall."
- l) Soils stockpiled for mitigation purposes for over one year require the reintroduction of naturally occurring microbes, prior to use in mitigation sites. This shall be accomplished through introduction of soils microbial inoculants, or through introduction of well decomposed organic matter.
- m) The Port shall redevelop the sample data sheets to meet all the monitoring requirements set forth this order.

- n) Auburn Mitigation Site- Emergent marsh plants shall be planted with rhizomes 12" on center (o.c.) instead of the 18" o.c. currently specified. Areas that are designated for hydroseeding that have visible surface water at the time of planting those areas shall be planted with plugs. Routine maintenance, such as, weeding, removal of non-native species, and watering, shall occur at least twice a year in all areas and more often in areas if needed. The maintenance crew shall be overseen by a wetland biologist to assist with identifying invasive species and identifying problem areas.
- o) Vacca Farm Mitigation Site- Revised Table 5.1-7 of the NRMP (July 31, 2001) Final performance standards shall have a note added that reads: "Observable surface flow must be present in the created channel at all times."
- p) Contingency measures and additional monitoring of the mitigation areas shall be required by Ecology if wetland monitoring reveals that vegetation establishment or wildlife use of the wetland is not sufficient to meet the success standards. Additional monitoring may be required beyond the fifteen (15) year period if mitigation success is not achieved within the fifteen (15) year monitoring period.
- q) The wetland mitigation planting plan shall be field inspected by Parametrix, Inc. or another qualified wetland consulting firm during construction and planting to ensure proper installation.
- r) The boundaries of the mitigation area and buffers shall be permanently marked with stakes at least every 100 feet or with construction fencing. The marking shall include signage that clearly indicates that mowing and fertilizer/pesticide applications are prohibited within mitigation areas.
- s) Ecology and the U.S. Army Corps of Engineers shall be notified a minimum of three days in advance of field monitoring work by the Port. Ecology or its designee shall be allowed access to all mitigation sites for the entire monitoring period.

2. Restrictive Covenants:

The Port shall place restrictive covenants on the deeds for the following mitigation sites: Miller Creek Mitigation Area; Miller Creek/Lora Lake/Vacca Farm Wetland and Floodplain Mitigation Area; Tyee Valley Golf Course Mitigation Area; Auburn Wetland Mitigation Area; and Des Moines Creek Mitigation Area (June 28, 2001, Foster, Pepper and Shefelman). The Port shall record the restrictive covenants with King County no later than sixty (60) days after the issuance by the U.S. Army Corps of Engineers of the Section 404 required for construction of the Master Plan Update projects.

Any changes to the restrictive covenants shall require written approval by Ecology.



Violation of any term of the restrictive covenants shall be considered a violation of this Order.

3. Submittal of a Revised Mitigation Plan

The Port shall submit to Ecology for its review and written approval a revised NRMP which includes the changes or additions required by this Order for review and written approval no later than December 31, 2001. The revised NRMP shall include revised plan sheets that address the corrections required in **Attachment B**.

If, after revision of the NRMP required by this Order, the Port submits a further revised NRMP to the U.S. Army Corps of Engineers for review, the Port shall simultaneously submit the same revised NRMP to Ecology for its review and written approval. No fill shall be placed in waters of the state until the revised NRMP submitted to the U.S. Army Corps of Engineers has been approved by Ecology.

A Final NRMP shall be prepared and submitted to Ecology within three months after a Section 404 permit has been issued by the U.S. Army Corps of Engineers.

4. Mitigation for Temporary Impacts

The December 2000 NRMP indicates that up to 2.05 acres of wetlands will be affected by the construction of temporary stormwater management ponds and other construction impacts (p. 4-8 and other). Approximately 1.25 acres will result from the construction of the stormwater ponds in the Miller Creek basin. Ecology has determined that the impacts characterized as "temporary" in the NRMP are not temporal in nature because they will last for longer than a one-year period. The agency considers these impacts to be permanent and has determined that additional in-basin mitigation is necessary in the Miller Creek basin. Additional mitigation is necessary in order to mitigate for hydrologic, water quality and general habitat impacts that will result from the "temporary" impacts. In-basin mitigation is necessary to provide a "temporal lift" of wetland water quality and general habitat functions.

In order to compensate for these unmitigated impacts in the Miller Creek basin, the Port shall prepare a mitigation plan for submittal to Ecology for its review and written approval. A conceptual plan shall be submitted to Ecology for review and written approval by November 9, 2001. Upon receipt of Ecology's written approval of the mitigation plan, the Port shall amend the NRMP to incorporate the approved mitigation plan. The plan must contain the following elements:

- a) The wetland/riparian zone comprised of Wetlands A17b/c/d (Wetland A17 Complex) and "Water D" shall be added to the wetland and buffer

restoration/enhancement on Miller Creek. This area is depicted in **Attachment C** titled "Wetland A17 Complex". A 100-foot buffer shall be placed to envelop this system. Wetlands A17b/c/d comprise a total of 2.64 acres and "Water D" totals 0.16 acres for a combined total of 2.80 acres (not including the buffer). The buffer shall be averaged, similar to the buffer on Miller Creek. The buffer area may include location of the airport detection system (ADS) to the extent that its footprint has been minimized to the extent practicable.

- b) The plan shall use the same goals and performance standards as the NRMP approved by this Order.
- c) The plan shall evaluate the feasibility of improving the hydrologic connection of the Wetland A17 Complex to Miller Creek via "Water D", including but not limited to removing the underground pipe. If it is feasible to improve the hydrologic connection of the Wetland A17 Complex to Miller Creek via "Water D", the Port shall include a plan for improving the connection in its submittal.
- d) Homes, driveways, concrete, fill, septic systems and other unsuitable material with be removed from Wetlands A17b/c/d, in a manner that meets the treatment protocol established for the Miller Creek restoration in the NRMP.
- e) The plan shall develop a buffer restoration and re-vegetation plan for this area that meets the treatment protocol for the Miller Creek restoration in the NRMP. This shall include the removal of invasive species, and replanting of appropriate native species.
- f) The plan shall evaluate the potential for wetland restoration, creation and enhancement within this new mitigation zone. This shall include evaluation of the reconnection of Wetlands A17b and A17c by removal of the road between them and removal of the road that separates Wetlands A17a and A17b. Ecology recognizes the need for an access road to the TRACON facility between Wetlands A17c and A17d.
- g) The buffer shall be joined with the buffer on Miller Creek to the south.
- h) A restrictive covenant shall be drafted for this additional mitigation area. The restrictive covenant shall be consistent with other restrictive covenants established for this project. The Port shall record the restrictive covenants with King County no later than sixty (60) days after the issuance by the U.S. Army Corps of Engineers of the Section 404 required for construction of the Master Plan Update projects.

5. Borrow Site One –

The performance standards for Borrow Site One in Table 5.3-6 of the NRMP (July 31, 2001) allow for monitoring of the wetland hydrology. The evaluation approach shall compare the shallow groundwater data collected to data collected pre-construction. Wetlands 48, B15, 32, B12, B4, and B1 shall be evaluated using this approach. The Port shall provide to Ecology bi-monthly hydrologic monitoring during the wet seasons, November through May, for at least three (3) years after completion. Maps of sample locations and vegetation in the surrounding areas, observation of stressed vegetation, any adaptive management implemented in the surrounding areas, comparison to baseline data, and conclusions shall be documented and submitted to Ecology on a monthly basis during that period. At the end of each water year the Port shall complete and submit to Ecology a trends analysis with proposed contingency measures identified and a schedule for completion of the proposed contingency measures.

6. Borrow Site Three- The following conditions apply to Borrow Site 3:

- a) The site plan from Hart Crowser titled Post Reclamation Topographic detail Borrow Area 3 Wetland Protection Swale HNTB revision (June 15, 2001 Draft) shows a flow dispersal trench overlapping with a small portion of Wetland 29. The flow dispersal trench shall not be constructed so that it is in the wetland.
- b) The wetland protection swale shall be lined (with HDPE or other similar liner material) where necessary to minimize infiltration of captured seepage water through the bottom of the swale (as described in Hart Crowser 2000b Sea-Tac Airport Third Runway – Borrow Area 3 Preservation of Wetlands; memorandum from Michael Kenrick and Michael Bailey (Hart Crowser) to Jim Thomson (HNTB) on wetland hydrology and proposed drainage swale design (October 20, 2000)).
- c) Excess water from the stormwater overflow structure shall be diverted away from the wetland protection swale to a stormwater detention pond (as described in Hart Crowser 2000b Sea-Tac Airport Third Runway – Borrow Area 3 Preservation of Wetlands; memorandum from Michael Kenrick and Michael Bailey (Hart Crowser) to Jim Thomson (HNTB) on wetland hydrology and proposed drainage swale design (October 20, 2000)).
- d) The Port shall monitor hydrologic conditions of wetlands remaining in and adjacent to the borrow sites. Hydrologic monitoring using piezometers and shallow hand dug soil pits in undisturbed wetlands associated with Borrow Site Three shall be conducted with sufficient frequency to determine wet season trends. Special emphasis shall be given to the area near where the drainage swale discharges into Wetland 29, to provide an early indication of hydrologic duress to plants in the wetland. The Port shall provide to Ecology bi-monthly hydrologic



during the wet seasons, November through May, before construction and for at least three (3) years after completion. Maps of sample locations and vegetation in the surrounding areas, observation of stressed vegetation, any adaptive management implemented in the surrounding areas, comparison to baseline data, and conclusions shall be documented and submitted to Ecology on a monthly basis during that period. At the end of each water year the Port shall complete and submit to Ecology a trends analysis with proposed contingency measures identified and a schedule for completion of the proposed contingency measures.

- e) The wetland protection swale shall be inspected and maintained at a minimum frequency of two (2) times per year. Swale maintenance shall include adjustment of flow control weir boards to provide appropriate flows to Wetland 29, and removal of vegetation or fill in the swale which may interfere with the seepage collection and diversion functions of the swale. The weir shall be calibrated so that flow rates can be observed at any time.
- f) **Increased Buffer Area:** In order to protect the hydrologic functions, and hydrology supporting Wetlands 29, 30, B5, B6, B7, and B9, all areas up slope of the wetlands within the property shall be included in the wetland buffer. Additionally, the Port shall ensure protection of hydrology to Wetlands 29, 30, B5, B6, B7, and B9 from future development. The wetland protection swale shall also be included in a restrictive covenant, with 25 foot buffers on either side of the swale. Those areas are depicted in **Attachment D (Revised)**, Borrow Area 3 Wetland Buffer. A restrictive covenant shall be drafted for this additional buffer area. The restrictive covenant shall be consistent with other restrictive covenants established for this project. The Port shall record the restrictive covenants with King County no later than sixty (60) days after the issuance by the U.S. Army Corps of Engineers of the Section 404 required for construction of the Master Plan Update projects. This condition applies only to property currently owned by the Port.
- g) The performance standards in Table 5.3-6 of the NRMP (July 31, 2001) allow for monitoring of the surface water in Wetland 30. The evaluation approach states that shallow groundwater monitoring wells will be used. The evaluation approach shall be changed to provide that surface water depths are measured monthly during the period from December through April, and the monitoring results compared to pre-construction data.

7. Wetland, Stream and Riparian Mitigation Monitoring and Reporting:

- a) Monitoring of all wetland mitigation sites identified in the December 2000 NRMP and the June 2001 Auburn Grading and Planting Plan, as revised below, shall be incorporated into the Final NRMP submitted to Ecology.

- i) Monitoring shall be completed at least yearly for a fifteen (15) year period with initial monitoring starting after the first growing season after installation of plants. If at any point during the monitoring period the results of monitoring show that the success criteria established in the plan are not being met, Ecology may require corrective action, additional monitoring, and additional mitigation.
- ii) The Port shall prepare and submit annual monitoring reports to Ecology's Federal Permit Manager, SeaTac Third Runway, Northwest Regional Office, 3190 160<sup>th</sup> Avenue SE, Bellevue, WA 98008-5452 no later than December 31<sup>st</sup> of each year following the first year of the mitigation site work. Each year's monitoring report shall include photographic documentation of the project taken from permanent reference points. The Port shall identify and incorporate permanent reference points into the Final NRMP.
- iii) As-Built Report: An as-built report documenting the final design of all wetland mitigation sites shall be prepared when the initial planting is completed. The report shall include the following:
  - final site topography;
  - photographs of the area taken from established permanent reference points;
  - a planting plan showing species, densities, sizes, and approximate locations of plants, as well as plant sources and the time of planting;
  - habitat features (snags, large woody debris, etc) and their locations;
  - drawings in the report shall clearly identify the boundaries of the project;
  - locations of sampling and monitoring sites; and
  - any changes to the plan that occurred during construction.

The As-Built Report shall include detailed plans showing locations of all monitoring transects and locations. All vegetation sampling and analysis shall employ statistically valid sampling and analysis procedures during each of the monitoring events. Monitoring reports shall show all sampling locations, discuss trends and changes, discuss success in achieving performance standards or other implementation difficulties, provide remedies to address implementation problems, and set forth a timeline for their resolution. Supporting data and calculations shall be maintained by the contractor and made available to Ecology upon request.

- iv) The As Built Report shall be sent to Ecology's Federal Permit Manager, SeaTac Third Runway within sixty (60) days of completing the mitigation site.
- v) Any proposed changes to the wetland mitigation and monitoring protocol

established in the NRMP and as revised by this Order, must be approved in writing by Ecology prior to implementation of any changes.

**E. Conditions for Acceptance of Fill to be used in Construction of the Third Runway and Associated Master Plan Update Improvements:**

The use of imported fill for projects for which the §404 permit was sought, e.g., Third Runway, Runway Safety Areas, South Aviation Support Area, and other appropriate Master Plan Update Improvements as determined by Ecology (Port 404 Projects) may result in impacts to wetlands or other waters of the state. To ensure compliance with measures designed to minimize potential impacts, the Port shall submit borrow site clean fill certification documentation described in the following sections to Ecology for review and written approval prior to fill placement.

**1. Fill Documentation/Fill Criteria/Fill Source**

The Port shall adhere to the following conditions to ensure that the fill placed for Port 404 Projects does not contain toxic materials in toxic amounts, thereby preventing the introduction of toxic materials in toxic amounts into waters of the state which includes wetlands.

**a) Documentation**

No later than five (5) business days prior to accepting any fill materials for use on Port 404 Projects, the Port shall submit to Ecology's Federal Permit Manager, SeaTac Third Runway, documentation certifying that the proposed fill source meets the criteria of this Order. The documentation shall contain an environmental assessment of the fill source and shall verify that excavated soil from the proposed fill source complies with the fill criteria set forth below. Findings of the environmental assessment are subject to the review of Ecology. Ecology reserves the right to disapprove fill materials following review of the Port's supporting documentation and a determination that the fill criteria were not met. In the event of such disapproval, Ecology reserves its rights to enforce the terms of the Order and require appropriate remedial measures.

The environmental assessment shall be conducted by an environmental professional in general conformance with the American Society for Testing and Materials Standard (ASTM) E 1527-00 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, and E 1903-97 Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process. At minimum, the document shall contain the following information:

- i) **Fill Source Description:** Provide a description/location of the fill source, general characteristics of the fill source and vicinity, current use, and a site plan identifying the extent of the excavation, project schedule and the estimated



quantity of fill to be transported to Port 404 Projects.

- ii) Records Review: Obtain and review environmental records of the proposed fill source site and adjoining properties. In addition to the standard federal and local environmental record sources, the following Ecology environmental databases shall be reviewed:

- Confirmed & Suspected Contaminated Site Report
- No Further Action Site List
- Underground Storage Tank List
- Leaking Underground Storage Tank List
- Site Register.

Records review shall also contain historical use information of the fill source and the surrounding area to help identify the likelihood of environmental contamination.

- iii) Site Reconnaissance: Documentation of visits to each site that identifies current site use and site conditions to assist in identifying the likelihood of environmental contamination and/or the potential migration of hazardous substances onto the site from adjoining properties.

- iv) Fill Source Sampling: Collect and analyze fill materials for the potential contaminant(s) identified in the Phase I Environmental Site Assessment. At a minimum, fill materials from each fill source shall be analyzed for the following hazardous substances

- Total Antimony
- Total Arsenic
- Total Beryllium
- Total Cadmium
- Total Chromium<sup>1</sup>
- Total Copper
- Total Lead
- Total Mercury
- Total Nickel
- Total Selenium
- Total Silver
- Total Thallium
- Total Zinc
- NWTPH-HCID

<sup>1</sup> Chromium (VI) shall be analyzed if the results of the Phase I Environmental Site Assessment show a

likelihood of Chromium (VI) contamination.

For fill source characterization, the **minimum** number of samples of the proposed fill shall reflect the number of samples required by MTCA.

Samples shall be collected at locations that are representative of the fill destined for Port 404 Projects.

For fill sources with suspected contamination identified by the Phase I Environmental Site Assessment or with complex site conditions, please consult with Ecology's Federal Permit Manager, SeaTac Third Runway for the appropriate sampling requirements.

b) Fill Criteria

The results of the Phase II Environmental Site Assessment sampling and testing shall be compared to the fill criteria to determine the suitability of the fill source for Port 404 Projects.

**The following table establishes the fill criteria limitations for the hazardous substances identified in Section E1(a)(iv) of this Order.**

Hazardous Substances	Fill Criteria mg/kg <sup>2</sup>
Antimony	16
Arsenic	20
Beryllium	0.6
Cadmium	2
Chromium <sup>3</sup>	42/2000
Copper	36
Lead <sup>4</sup>	220/250
Mercury	2
Nickel <sup>5</sup>	100/110
Selenium	0.75
Silver	0.28
Thallium	2
Zinc	85
TPH	0 <sup>6</sup>

<sup>2</sup> mg/kg ≡ milligrams per kilogram

- <sup>3</sup> Fill with total chromium concentrations greater than 42 mg/kg and less than 2000 mg/kg may be placed to within six feet of the ground surface. No fill with total chromium concentrations greater than 42 mg/kg may be placed within the first six feet of the embankment. No fill with chromium (VI) concentrations greater than 19 mg/kg may be placed within the embankment.
- <sup>4</sup> Fill with total lead concentrations greater than 220 mg/kg and less than 250 mg/kg may be placed to within six feet of the ground surface. No fill with total lead concentrations greater than 220 mg/kg may be placed within the first six feet of the embankment.
- <sup>5</sup> Fill with total nickel concentrations greater than 100 mg/kg and less than 110 mg/kg may be placed to within six feet of the ground surface. No fill with total nickel concentrations greater than 100 mg/kg may be placed within the first six feet of the embankment.
- <sup>6</sup> The limit of 0 means nondetectable, as determined by Ecology.

For hazardous substances other than those identified in the above fill criteria table that have been identified in the Phase II Environmental Site Assessment, the Port shall consult with Ecology's Federal Permit Manager, SeaTac Third Runway for the applicable fill criteria.

As an alternative to applying the limitations listed above for the material within the top six feet of the existing ground surface and/or within the first six feet of the embankment (as noted in footnotes two through six above), the Port may construct a "drainage layer cover" (that layer immediately above the drainage layer of the embankment) that will measure at least forty (40) feet thick at the face of the embankment and will reduce in height to the east at a rate of two (2) percent. The fill criteria listed above for the first six feet of the embankment will apply to the drainage layer cover. If proposed fill (for either the drainage layer cover or the rest of the embankment or other Port 404 Projects) does not meet the fill criteria in Condition E.1.(b), the Port can demonstrate the suitability of that fill by employing a Synthetic Precipitation Leaching Procedure (SPLP), SW-846 Method 1312. SPLP testing shall be conducted in accordance with the SPLP work plan, **Attachment E**, or as amended in the future. SPLP results must be compared against both surface and groundwater quality criteria. Where the Port utilizes the SPLP method to demonstrate the suitability of fill, SPLP test results shall be provided to Ecology at least ten (10) business days prior to fill placement. As per Condition E.1.(a), Ecology reserves the right to disapprove the use of fill analyzed under the SPLP method.

c) Fill Sources

Fill materials for Port 404 Projects shall be limited to the following three sources:

- i) State-certified borrow pits
- ii) Contractor-certified construction sites
- iii) Port of Seattle-owned properties.



d) Prohibited Fill Sources

The following fill sources are prohibited for use on Port 404 Projects:

- Fill which consists in whole or in part of soils or materials that are determined to be contaminated following a Phase I or Phase II site assessment.
- Fill which consists in whole or in part of soils or materials that were previously determined to be contaminated by a Phase I or Phase II site assessment and have been treated in some manner so to be considered re-mediated soils or fill material.

2. As-Built Documentation

The Port shall provide to Ecology for review monthly summaries of:

- Names and locations of fill sources placed for the previous month
- Quantities of fill materials from these fill sources
- Locations and elevations of fill source materials placed within the Port 404 Projects.

Ecology may require additional compliance conditions and/or corrective actions upon Ecology's review of the as-built documents. The monthly summaries shall be provided to Ecology no later than fifteen (15) days following the last day of the month.

3. Post Construction Monitoring

The Port shall monitor runoff and seepage from Port 404 Projects where fill is placed for compliance with applicable Washington State surface water criteria. Ground water down-gradient from the fill area shall be monitored for compliance with applicable ground water criteria.

Within 60 days after the issuance of the 401 Water Quality Certification for the Master Plan Update Improvements, the Port shall submit to Ecology for review and written approval a Surface Water and Ground Water Monitoring Plan. The monitoring plan shall be designed to detect impacts of the fill embankment to the receiving water and to the ground water during fill placement and post fill placement. In the event monitoring detects exceedances of the water quality criteria in either surface or ground water; Ecology shall take action to eliminate the exceedances. This may include a revision to the fill criteria and/or require corrective action.

**F. Conditions to Prevent Transport of Contaminants:**

1. All Master Plan Update Improvements and all associated utility corridors shall be

constructed in a manner that will prevent the possible interception of contaminated groundwater originating from the Airport Maintenance and Operations Area or other potentially contaminated Seattle-Tacoma International Airport (STIA) areas. The Port shall submit to Ecology proposed construction BMPs to prevent interception of contaminated groundwater by utility corridors and a plan to monitor potential contaminant transport to soil and groundwater via subsurface utility lines at the STIA and submit it to Ecology for review and written approval no later than November 9, 2001. The plan shall be submitted to Ecology's Federal Permit Manager, SeaTac Third Runway.

2. The Port shall have staff trained in the detection of hazardous materials and contaminated soils or water inspect on a regular basis all areas where there is clearing and grading, or construction under way by Port contractors or employees. If hazardous materials or contaminated soils or other indications of contamination are discovered the Port shall immediately cease construction in the suspect area, secure the site and clean up the area in accordance with the Model Toxics Control Act (MTCA), Chapter 70.105d RCW, the Hazardous Waste Management Act, Chapter 70.105 RCW, and with generally accepted best management practices.
3. The Port shall administer and periodically update the contaminant database and contaminant maps and figures for the STIA. The database shall be updated as new information is received. The maps and figures shall be updated annually and delivered to Ecology's Federal Permit Manager, SeaTac Third Runway in a report of findings for review. Maps and figures shall be similar to the maps and figures shown in the Port's "Analysis of Preferential Ground Water Flow Paths Relative to Proposed Third Runway," dated June 21, 2001.
4. The Port shall collect all new environmental data generated by construction activities, cleanup actions, or any other environmental investigations of soil and groundwater throughout the STIA. The information shall be used to update the contaminant database. The Port, airport tenants, and other entities conducting environmental investigations shall continue to provide reports of ongoing cleanup actions and any new contamination discovered to Ecology as required by the MTCA.

#### **G. Dam Safety Requirements:**

1. All facilities identified in Table 3-1 of the Comprehensive Stormwater Management Plan (CSMP) that meet the requirements of Chapter 173-175 WAC (Dam Safety Regulations) shall obtain a Dam Safety Permit from Ecology prior to commencement of construction. If any stormwater facilities identified in the CSMP change during final design such that they meet the requirements of Chapter 173-175 WAC, those facilities shall obtain a Dam Safety Permit from Ecology prior to commencement of construction.

#### **H. Conditions for Upland Construction Activities:**

1. During construction the Port shall comply with all stormwater requirements within the National Pollutant Discharge Elimination System (NPDES) Permit No. WA-002465-1 as modified on May 29, 2001 for this project.
2. The project shall be clearly marked/staked prior to construction. Clearing limits, travel corridors and stockpile sites shall be clearly marked. Sensitive areas to be protected from disturbance shall be delineated and marked with brightly colored construction fence, so as to be clearly visible to equipment operators. All project staff shall be trained to recognize construction fencing that identifies sensitive areas boundaries (wetlands, streams, riparian corridors, buffers, etc.). Equipment shall enter and operate only within the delineated clearing limits, corridors and stockpile areas.
3. The Port shall follow and implement all specifications for erosion and sediment control specified in the Stormwater Pollution Prevention Plan (SWPPP) and/or Erosion and Sediment Control (ESC) plan as required in the NPDES permit. The erosion control devices shall be in place before starting construction and shall be maintained, so as to be effective throughout construction.
4. Stormwater Detention for New Outfalls: Any new diversion ditch or channel, pond, trap, impoundment or other detention or retention BMP constructed at the site for treatment of stormwater shall be designed, constructed, and maintained to contain and provide treatment for the peak flow for the ten (10)-year 24 hour precipitation event estimated from data published by the National Oceanic and Atmospheric Administration.
5. The Port shall periodically inspect and maintain all erosion control structures. Inspections shall be conducted no less than every seven (7) days from the start of the project to final site stabilization. Daily inspections of sedimentation ponds shall occur during wet seasons. Additional inspections shall be conducted after rainfall events greater than 0.5 inches per 24-hour period, to ensure erosion control measures are in working condition. These inspections shall be conducted within 24 hours after the event. Any damaged structures shall be repaired immediately. If it is determined during the inspection that additional measures are needed to control stormwater and erosion, such measures shall be implemented immediately. Inspections shall be documented in writing and shall be available for Ecology's review upon request.
6. Wash water containing oils, grease, or other hazardous materials resulting from wash down of equipment or working areas shall not be discharged into state waters except as authorized by an NPDES permit or state waste discharge permit.

7. Machinery and equipment used during construction shall be serviced, fueled, and maintained on uplands in order to prevent contamination to surface waters.
8. Grading/Construction in Borrow Areas: The depth of the excavation at the borrow areas shall be limited to a depth ten (10) feet above the maximum seasonal groundwater table. The maximum seasonal ground water table shall be determined by the monitoring wells on Port property. Depth of excavation and maximum seasonal ground water elevations shall be submitted annually to Ecology's Federal Permit Manager, SeaTac Third Runway.

**I. Conditions for Mitigation of Low Flow Impacts:**

1. Ecology has reviewed and approved the December 2000 Low Streamflow Analysis and the Summer Low Flow Impact Offset Facility Proposal dated July 23, 2001. In order to ensure clarity, within 45 days of receipt of this Order the Port shall submit a revised plan integrating the Low Streamflow Analysis and Summer Low Flow Impact Offset Facility Proposal into a single document that addresses the following issues:
  - a) General:
    - i) The revised plan shall be stamped by a licensed professional civil engineer.
    - ii) All supporting documents shall be clearly labeled and included in a technical appendix and/or on one clearly labeled CDROM. Only those files which directly correspond to results presented in the report should be included.
    - iii) The plan shall include a specific section discussing the accuracy of the calibration in predicting low flows at upper stream gauges, and a statement of adequacy of the calibrations for the purpose of low flow simulation.
    - iv) Revised conceptual drawings for reserve storage vaults shall be submitted that include any changes required by this Order and that include details on how constant discharge will be maintained in reservoirs with variable hydraulic head pressures. Reserve vault inlets and outlets shall be configured so that water is added/discharged from the middle of the reserve storage depth in order to avoid disturbing sediments and/or floatables that could be present in the reserve vault. In order to ensure that reserve water is well aerated, reserve storage vaults shall include open ventilation consistent with King County Surface Water Design Manual wetvaults. Mechanical aeration shall be provided if grating is not feasible. Conceptual drawings shall include detail on reserve water outfalls. Where feasible, outfalls shall discharge directly to wetlands that are adjacent (in



- hydrologic continuity) to streams rather than directly to streams.
- v) A final Operations and Maintenance Plan shall be included in the revised plan. The Operations and Maintenance plan section of the report shall require the release of any water remaining in the reserve vaults during the month of November or until substantial rains occur. The Operations and Maintenance Plan shall address management of accumulated sediments in reserve storage vaults. All accumulated sediments shall be disposed of in an appropriate upland disposal site.
  - vi) The revised plan shall include a monitoring protocol to determine whether placement of the Third Runway embankment fill and other fill used for Master Plan Update Improvements meets fill specifications for type of material, meets specifications for compaction rates, and meets assumption for infiltration rates.
  - vii) The revised plan shall include contingency measures to offset reduced recharge in the event the Third Runway embankment fill and other fill used for Master Plan Update Improvements does not meet performance standards for infiltration rates.
  - viii) The revised plan shall include information demonstrating that low flow mitigation (vault releases) can be conveyed to streams without being lost to soil.
  - ix) The Port shall develop a pilot program to test one reserve stormwater vault for performance. The Port shall include a proposal for a pilot in the revised plan. The pilot shall be completed within three years after receipt of the Section 404 permit from the U.S. Army Corps of Engineers.
  - x) The revised plan shall identify and analyze all direct or indirect impacts to wetlands as a result of low flow impacts and the proposed low flow mitigation. The revised plan shall contain contingencies to mitigate for impacts to wetlands if wetland impacts are identified as a result of monitoring.

b) Des Moines Creek-

- i) The revised plan shall provide data comparing the existing simulation of low flows against the Tyee Golf Course weir gauge data. The Port shall provide representative hydrographs, associated discussion and statement of adequacy of the calibration for simulating low flows.
- ii) SDS3 vault design (sheet C141) indicates that not all inlet pipes are tributary to the reserve storage vault. The revised plan shall factor into the vault filling calculations the effects of having a reduced tributary area.
- iii) SDS4 vault design (sheet 139) shall be reconfigured to show the vault inlet pipe at a lower elevation. A note similar to the one found on exhibit C131 should be included here. The Port shall evaluate the feasibility of providing reserve storage only in the SDS3 vault.

c) Walker Creek-

- i) In place of the Port's proposal to line 3.5 acres of filter strip within the SDW2 subbasin, the Port's revised plan shall provide that low flow mitigation water for Walker Creek will be obtained from the collection of winter runoff from the 69 acres of impervious surface being added in the Walker Creek non-contiguous groundwater basin. Reserve stormwater collected from this area may be stored in either the proposed 15-acre foot vault in Walker Creek or in the SDS3 vault. If, within thirty (30) days of receiving this order, the Port submits to Ecology information demonstrating that another feasible and implementable alternative exists, Ecology will review the alternative and consider amending this Order to allow implementation of the alternative.
- ii) The current proposal for Walker Creek assumes no contribution from the Third Runway embankment fill. If the revised plan includes a reinstatement of the Third Runway embankment model, the area of the fill embankment tributary to Walker Creek shall be verified and modeled accordingly.

d) Miller Creek-

- i) The revised plan shall verify whether the 1991 impact number is 0.11cfs or 0.12cfs. Unless shown otherwise, Ecology shall presume that 0.12cfs is the correct number.
- ii) The revised plan shall include the correct "Low Flow Miller 91-94.xls" file and back-up data that produce a future 1991 7-day low flow of 0.67cfs shall be included on CDROM.
- iii) The revised plan shall include documentation that clarifies whether the existing (1994) condition 1991 low flow is 0.784cfs as was used in electronic files or 0.79cfs as was presented in the July 23, 2001 memorandum.
- iv) The revised plan shall correct the impervious acreage figures provided for the new North Employees Parking Lot (NEPL) vault to reflect 26.29 acres of impervious (Miller 2006 HSPF model), rather than 32.31 acres.
- v) The Port shall evaluate orifice sizing and determine whether a change in orifice size and/or a reduction in the number of reserve stormwater vaults is warranted. The revised plan shall evaluate vault locations for feasibility and special design considerations (e.g., upstream spill control, oil controls, downstream compost filters, etc.) to ensure that reserve stormwater from the NEPL and cargo vaults will receive adequate treatment to ensure water quality.
- vi) The revised plan shall include BMPs developed to ensure infiltration into the Third Runway embankment rather than into the Third Runway embankment

conveyance system.

vii) The revised plan shall include revised Grading and Drainage sheets 129 and 130. The revised sheets shall clarify the flow in the collection swales.

viii) Revised conceptual drawings, and supporting analysis, shall be submitted with the revised plan that address water quality concerns for the NEPL and Cargo reserve storage areas.

e) Monitoring and Reporting Requirements: The revised plan shall develop a comprehensive monitoring protocol that, at a minimum, addresses the following elements:

i) Collection of stream gage data and an evaluation/correlation to expected flow rates established by the model.

ii) Water quality sampling and reporting. Water quality shall be tested at vault outflow and instream at a point 100 feet downstream of the outflow.

iii) Metering of water from vaults.

iv) Infiltration rate sampling and monitoring to evaluate performance of the fill.

v) Contingency if water quality in vaults does not meet water quality criteria (e.g., additional treatment, other source, flocculation, coalescing oil water separator, etc.).

vi) Instream biologic monitoring shall occur in Des Moines, Miller and Walker Creeks to assess the impacts of the Port's low flow offset proposal. The Port shall develop an instream monitoring protocol that shall at a minimum include the following elements:

- Existing low-flow conditions of Des Moines, Miller and Walker Creek will be evaluated by conducting Benthic Index of Biotic Integrity (BIBI) monitoring (Karr and Chu 1999). Monitoring shall occur four times per year and shall continue through year five (5) after construction and then yearly until completion of the fifteen (15)-year monitoring period. In addition to the BIBI monitoring required above, the Port shall develop a that monitors at a minimum temperature, turbidity, channel morphology, substrate quality, type and amount of large woody debris and other habitat features, riparian habitat cover and fish use. Representative stream channel cross-sections shall be utilized. Information must be synthesized to determine how these elements may be impacting overall stream health.

- Mitigation during the proposed period appears to effect low flow frequencies during June and July. Monitoring shall specifically address potential adverse impacts to fish or aquatic biota during June and July. If monitoring shows an adverse effect during this time period the Port shall implement contingencies to address the impact (such as providing additional mitigation water during June and July).

**J. Operational Stormwater Requirements:**

1. Approved Stormwater Plan: The Comprehensive Stormwater Management Plan (CSMP), Volumes 1 through 4, December 2000 as revised by the July 2001 Replacement pages is the approved stormwater management plan for this project. It shall be implemented in its entirety. No changes to the CSMP shall be made without prior review and written approval from Ecology.
  - a) The Port shall provide Ecology with draft proposed changes to the Plan no later than 60 days prior to the date it seeks to implement a change to the .
  - b) The Port shall implement the project in accordance with the schedule provided in Table A-3 (July 2001). Any changes to the schedule must be reviewed and approved in advance by Ecology. The Port shall provide Ecology with a draft revised schedule no later than 60 days prior to the date it seeks to implement the change to the schedule. The following facilities/projects listed in Table A-3 (July 2001) do not yet have approved stormwater treatment facilities, proposed: expansion of NEPL to 6000 stalls, additional taxiway exits on 16L/34R, additional expansion of main parking garage, additional expansion of NEPL, expansion of North Unit parking structure, SR 509 extension/South Access, ASDE, and NAVAIDS. If the Port decides to build any of these facilities/projects the Port must submit conceptual drawings that meet the performance standards of the CSMP to Ecology no later than sixty (60) days prior to the date it seeks to commence construction.
  - c) Retrofitting of stormwater management facilities at the STIA shall occur at a rate commensurate with the construction of new impervious surface at the STIA. For every ten (10) percent of new impervious surface added at the project site, the Port must demonstrate that twenty (20) percent of retrofitting has occurred unless demonstrated that a twenty (20) percent rate isn't feasible. One hundred (100) percent of the stormwater management facility retrofit shall be completed by the time fifty (50) percent of the impervious surfaces have been constructed. The Port shall document the implementation of retrofitting in quarterly progress reports. The Port shall develop and submit for review and written approval a schedule of construction of stormwater management facilities within 60 days after receipt of the Section 404 permit from the U.S. Army Corps of Engineers. Where the project schedule in the Stormwater Management Plan (including Table A-3) conflicts with this condition, the Port and Ecology shall discuss an appropriate retrofit schedule.
  - d) Nothing in this Order shall be deemed to prohibit continued participation



by the Port in planning efforts to establish regional detention facilities for Des Moines or Miller Creek. The Port may request to amend this Order and the Comprehensive Stormwater Management Plan if it decides to route stormwater to future regional detention facilities and it is demonstrated that under future build-out conditions the combination of on-site and regional flow controls will achieve the performance goals of the CSMP and the corresponding basin plan. If the Port decides to participate in future regional detention facilities, the Port shall submit documentation to Ecology that substantiates that Regional Detention Facilities will be constructed and that the Port may legally route stormwater to a RDF before Ecology will allow a change to the CSMP.

2. Discharge of operational stormwater to state receiving waters:

a) No stormwater generated by operation of new pollution generating impervious surfaces of projects for which the §404 permit was sought (excluding surfaces not to be included in the airport NPDES permit, e.g., South 154<sup>th</sup> Street which is a City of SeaTac facility) shall be discharged to state receiving waters until a site specific study, e.g., a Water Effects Ratio Study (WERS), has been completed and approved by Ecology and appropriate limitations and monitoring requirements have been established in the Port's NPDES permit. The study may use existing impervious surfaces as a surrogate for future new impervious surfaces, and it shall be submitted to Ecology for review and written approval. The Port shall consult with Ecology's Northwest Regional Office Water Quality Program's SeaTac NPDES Manager to determine an appropriate time for submittal of the study.

b) All stormwater discharges from the project shall be in compliance with state of Washington surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC) and ground water quality standards (Chapter 173-200 WAC).

c) The Port shall design, construct, operate, and maintain stormwater treatment facilities to ensure that discharges shall not result in exceedances of state water quality criteria in receiving waters. Ecology may require changes to the approved CSMP as a part of future NDPEs permits.

d) BMPs shall be selected from the enhanced treatment list for better removal of dissolved metals. If monitoring indicates a need for additional BMPs, the Port may propose other BMPs for stormwater treatment if it can be demonstrated that they will result in stormwater discharges that meet the state water quality standards. Any proposed changes are subject to review and written approval by Ecology.

e) The Port shall submit the final stormwater treatment and flow control facility designs to Ecology for review and written approval 60 days prior to the start of construction of the facilities. During final design the Port shall evaluate the likelihood that stormwater facilities will intercept groundwater and make modifications to the designs so as to either prevent the interception of groundwater or increase facility sizing to accommodate the groundwater. If facility sizes increase the Port shall evaluate potential impacts to wetlands and other waters of the state and whether the increase facility size triggers Dam Safety requirements under Chapter 173-175 WAC.

f) Within 180 days of issuance of this Order the Port shall submit to Ecology for review and written approval a Stormwater Facilities Operation and Maintenance Plan which addresses maintenance and operation of all STIA stormwater facilities approved by this Order. For the purpose of meeting this condition the Port may submit other existing documents or updates of other existing documents that meet this requirement. The Port shall identify methods to prevent overtopping of stormwater facilities and the Industrial Wastewater Treatment System to streams during design storm events.

g) The Port shall sample stormwater above and below stormwater outfalls and monitor the hardness of the receiving waters.

h) Water quality testing for toxicity to sensitive organisms, by the Port and approved by Ecology, shall measure injury, as well as mortality of those organisms.

**K. Construction Stormwater Limitations and Monitoring Requirements:**

1. Stormwater Pollution Prevention Plans shall be prepared in conformity with the Construction Stormwater/Dewatering requirements the NPDES permit.

2. Limitations

Stormwater discharges shall not cause a visible change in turbidity, color, or cause a visible oil sheen in the receiving water from any stormwater detention or retention pond.

3. Stormwater Monitoring Schedule for Construction Stormwater Discharges

The Port shall monitor each stormwater outfall discharge according to the following schedule:

- a) Turbidity and pH:

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- i) The Port shall monitor turbidity and pH in any surface water discharge from construction sites within 24 hours after any storm event of greater than 0.5 inches of rain per 24-hour period. The storm events shall be measured by an on-site rain gauge. The monitoring method shall be by a portable turbidimeter and a pH meter following the maintenance, operating and calibration procedures in the instrument's instruction manual. Alternatively, a grab sample shall be analyzed by a laboratory accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 173-50 WAC.
- ii) During each rain event the turbidimeter and pH meter shall also be used for the measurement of turbidity and pH upstream of the point of discharge to the receiving water and downstream of the thorough mixing of the discharge and the receiving water.

b) Oil, Grease and Temperature:

- i) The Port shall sample for oil, grease and temperature as follows:

Parameter	Units	Sample Point <sup>1</sup>	Minimum Sampling Frequency	Sample Type
Oil and Grease	Mg/l	Point of Discharge	When visible sheen observed	grab
Temperature	<sup>0</sup> C	Upstream <sup>2</sup> and downstream at the edge of the mixing zone (no greater than 100 feet)	Weekly <sup>3</sup>	grab

<sup>1</sup>Samples shall be collected from the outfall or an on-line stormwater drain access point nearest the outfall terminus.

<sup>2</sup> Background temperature measured at a point or points unaffected by the discharge and representative of the highest ambient water temperature in the vicinity of the discharge.

<sup>3</sup> During the months of July, August, and September

- ii) Sampling method for Oil and Grease: The MDL for oil and grease is 0.2 mg/L using trichlorotrifluoroethane extraction and gravimetric analysis using EPA Method 413.1. The quantitation level (QL) for oil and grease is 1.0 mg/L (5 x MDL). An equivalent method is Method 1664 using normal hexane (n-hexane) as the extraction solvent in place of 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113; Freon-113). An

equivalent method is total petroleum hydrocarbons with a MDL of 0.1 mg/L using Gas Chromatography and Flame Ionization Detector (FID) and Method WTPH-Dx Diesel (WTPH-D) from the Washington State Department of Ecology Method WTPH-D. The quantitation level (QL) for TPH-Dx is 0.5 mg/L (5 x MDL).

- c. If monitoring indicates a need for additional BMPs, the Port may propose other BMPs for stormwater treatment if it can be demonstrated that they will result in stormwater discharges that meet the state water quality standards. Any proposed changes are subject to review and written approval by Ecology.
4. Stormwater Detention for New Outfalls  
Any new diversion ditch or channel, pond, trap, impoundment or other detention or retention BMP constructed at the site for treatment of stormwater shall be designed, constructed, and maintained to contain and provide treatment for the peak flow for the ten (10) year 24 hour precipitation event estimated from data published by the National Oceanic and Atmospheric Administration.
5. Vehicle Trackout  
Vehicles shall be cleaned of mud, rock, and other material before entering a paved public highway so that tracking of sediment onto the highway does not occur.
6. Reporting - Construction stormwater  
Monitoring results for construction stormwater discharges shall be submitted every other month to Ecology's Federal Permit Manager, SeaTac Third Runway. Monitoring shall be reviewed for compliance with WAC 173-201A.
7. The Port shall document the use of any additives in the treatment of discharge water. Documentation shall identify the additives used, their commercial source, the material safety data sheet, and the appropriate application rate. The Port shall retain this information on-site or within reasonable access to the site and make it immediately available, upon request, to Ecology.

Additives to enhance solids settling before discharge to surface water must be applied according to the manufacturer's recommended dose. In addition, only additives of low toxicity to aquatic organisms, an  $LC_{50}$  equal to or greater than 100 mg/l, shall be used. The use of additives to enhance settling before discharge to surface water will not be allowed if the toxicity to aquatic organisms is not known.

8. In addition to the above, the Port shall submit a monitoring plan for stormwater and construction dewatering discharges from all construction projects including grading and construction of the Auburn mitigation site. The monitoring plan shall be submitted to Ecology for review and written approval at least thirty (30) days prior to the start of construction.



**L. Emergency/Contingency Requirements:**

1. The Port shall develop a spill prevention and containment plan for all aspects of this project, and shall have spill cleanup materials available on site.
2. Any work that is out of compliance with the provisions of this Order, causes distress death of fish, or any discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, is prohibited. If these occur, the Port shall immediately take the following actions:
  - a) Cease operations at the location of the violation.
  - b) Assess the cause of the water quality problem and take appropriate measures to correct the problem and/or prevent further environmental damage.
  - c) Notify Ecology of the failure to comply. Spill events shall be reported immediately to Ecology's 24-Hour Spill Response Team at 425-649-7000, and within 24 hours of other events contact Ecology's Federal Permit Manager, SeaTac Third Runway at 425-649-4310.
  - d) Submit a detailed written report to Ecology within five days that describes the nature of the event, corrective action taken and/or planned, steps to be taken to prevent a recurrence, results of any samples taken, and any other pertinent information.

Compliance with these requirements does not relieve the Port from responsibility to maintain continuous compliance with the terms and conditions of this Order or the resulting liability from failure to comply.

3. In the event of finding distressed, dying or dead fish, the Port shall collect fish specimens and water samples in the affected area, within the first hour of the event. These samples shall be held in refrigeration or on ice until the Port is instructed by Ecology on their disposition. Ecology may require analyses of these samples before allowing the work to resume.
4. In the event of a discharge of oil, fuel, or chemicals into state waters, or onto land with a potential for entry into state waters, containment and cleanup efforts shall begin immediately and be completed as soon as possible, taking precedence over normal work. Cleanup shall include proper disposal of any spilled material and used cleanup materials.
5. Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be maintained and stored properly to prevent

spills into state waters.

6. If at any time during work the Port finds buried chemical containers, such as drums, or any unusual conditions indicating disposal of chemicals, the Port shall immediately notify the Ecology's NWRO Regional Spill Response Office at 425-649-7000.

**M. General Conditions:**

1. This Order does not authorize direct, indirect, permanent, or temporary impacts to waters of the state or related aquatic resources, except as specifically provided for in conditions of this Order.
2. This Order does not exempt and is conditional upon compliance with other statutes and codes administered by federal, state, and local agencies.
3. Ecology retains continuing jurisdiction to make modifications hereto through supplemental Order, if it appears necessary to further protect the public interest.
4. The Port shall have a designee on-site, or on-call and readily accessible to the site, at all times while construction activities are occurring that may affect the quality of ground and surface waters of the state, including all periods of construction activities.
5. The Port's designee shall have adequate authority to ensure proper implementation of the Erosion and Sediment Control (ESC) Plan, as well as immediate corrective actions necessary because of changing field conditions. If the Port's designee issues a directive necessary to implement a portion of the ESC Plan or to prevent pollution to waters of the state, all personnel on site, including the construction contractor and the contractor's employees, shall immediately comply with this directive.
6. The Port shall provide access to the project site and all mitigation sites by Ecology or WDFW personnel for site inspections, monitoring, necessary data collection, or to ensure that conditions of this Order are being met.
7. Copies of this Order and all related permits, approvals, and documents shall be kept on the project site and readily available for reference by the project managers, construction managers and foremen, other employees and contractors of the Port, and state agency personnel.
8. The Port shall comply with all provisions of any Hydraulic Project Approval issued by the Washington Department of Fish and Wildlife. Work in or near the water that may affect fish migration, spawning, or rearing shall cease immediately upon a determination by WDFW that fisheries resources may be adversely affected.

June 7, 2004

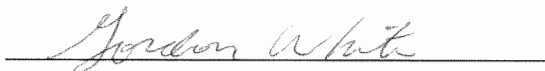
**N. Violations of the Order:**

Any person who fails to comply with any provision of this Order shall be liable for a penalty of up to ten thousand dollars (\$10,000) per violation for each day of continuing noncompliance. Violations of this Order shall be addressed in accordance with the requirements of RCW 90.42 and RCW 43.21B. Upon Ecology's determination that the Port is violating any condition of this Order, it shall serve notice of the violation to the Port by registered mail.

**O. Appeal process:**

Any person aggrieved by Order 1996-4-02325 (Amended-2) may obtain review thereof by appeal. Pursuant to ch. 43.21B. RCW, a person can appeal this order to the Pollution Control Hearings Board within 30 days of the date of receipt of this Order. Any such appeal must be sent to the Washington Pollution Control Hearings Board, PO Box 40903, Olympia, WA 98504-0903. Concurrently, a copy of the appeal must be sent to the Department of Ecology, Northwest Regional Office, Shorelands and Environmental Assistance Program, Attn: Ann Kenny, 3190 160<sup>th</sup> Avenue SE, Bellevue, WA 98008-5452. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Dated June 7, 2004 at Lacey, Washington.



Gordon White  
Program Manager  
Shorelands and Environmental Assistance Program

Water Quality Certification # 1996-4-02325 (Amended-2)  
June 7, 2004

**Attachment A: Contractor Statement**

PROJECT: Port of Seattle Third Runway & Master Plan Update Projects

I have read the Water Quality Certification/Coastal Zone Consistency Determination/Section 401 Permit (Order #1996-4-02325, Amended-2) and the National Pollutant Discharge Elimination System (NPDES) Permit for the above referenced project and, to the best of my ability, understand the requirements of those permits as they relate to those portions of the work that are being conducted under my supervision.

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Name (Signature)

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Name (Printed)

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Title

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Company or Organization



**Attachment B: NRMP Plan Set Revisions**

**Appendix A – Miller Creek Relocation and Floodplain Enhancement**

Sheet C3: Note 13. Provide revised sheet showing design of irrigation system and discuss irrigation plan in NRMP (timing, amounts of water, etc.).

Sheet C4: Provide revised sheet C4 showing no work in streams. Provide revised Grading plan C-129 showing no work in streams.

Sheet C7: Provide revised sheet with note detailing how woody debris will be anchored using cable or hemp.

On the swale section provide revised sheet showing that swale area will be seeded.

Sheet C-8: Provide revised sheet that shows steel anchors for all the logs in the stream channel with note that hemp rope anchors are expected to remain in place for 3-5 years.

Sheet TE1: Provide revised sheet with note on how the ditches will be blocked to prevent sediment migration.

Provide schedule or table that shows the sequence in which the different elements of the mitigation will be installed. (This applies to the Auburn site as well.)

Sheet L2: Revise sheet to show how young plants will be protected from sun exposure until they are well enough established to withstand exposure to the sun.

Revise Note 6 to state that except where needed to protect roots of conifers, care must be taken not to seed mulch collars.

Revise sheet to remove staking notes and details from sheet.

**Appendix B – Miller Creek In-stream and Buffer Enhancements**

Sheet C3: Revise sheet to show construction access points and add a note to the plans to minimize wetland and stream impacts. Provide note detailing how access points will be restored.

Sheet C4: Note 5. Add note to see sheet TE2 and add more details detailing how the channel will be de-watered during re-grading.

Sheet C5: Provide revised sheet if log orientation at 42+00 changes.

Note 2. Provide revised sheet with note. Discuss disposal of solid wastes in text of NRMP or in an Appendix. Provide information on how hazardous materials will be managed if discovered during the course of constructing the mitigation site.

Sheet C7: Provide revised sheet with note that details how project areas will be accessed. Also provide details on how access locations will be restored after the work has been completed.

Sheet C8: On Section 2, the coir lift is shown on the section but is not present on the plan. Provide revised sheet.

On Section 3, the logs on the plan view are not present on the section.  
Provide revised sheet.

On Section 5, the log shown on the plan view is not present on the section. The coir lift shown on the section is not shown on the plan.  
Provide revised sheet.

On Section 6, the log shown on the plan view is not present on the section.  
Provide revised sheet.

Sheet C9: In typical detail of coir fabric lifts, develop a specification for the quantity of willow cutting. Provide revised sheet.

Sheet C10: Provide revised sheet and include note on sheet that indicates that the geotextile fabric will be biodegradable. If this is discussed in text, then text must become part of final plan set.

Sheets TE1-TE4: Provide revised sheets adding note in notes section that states that equipment should not be driven in the streambed except where necessary to complete construction.

Sheet TE2: Provide revised sheet showing details for stream diversion structure and flow dispersion structure.

Provide revised sheet showing detail for the flexible by-pass pipe. Note that pipe should not be trenched in.

Indicate on plan sheet direction of sump discharge water with note that it is pumped to a treatment pond. Provide specific pond. Provide revised sheet.

Sheet TE5: On the live stake detail, specify the density of staking (inches on center).  
Provide revised sheet.

Sheet L1.1: Provide revised sheet with note that says that if S. 157<sup>th</sup> Place is determined not to be needed for access purposes it will be revegetated.

Sheet L2: Provide revised sheet with note that says that if S. 160<sup>th</sup> Street is not needed for access it will be revegetated.

Sheet L3: It is unclear how much of this area will be cleared.  
Provide revised sheet with correct cross-hatching in wetland.

Sheet L5: Clarify why some of Wetland R11 shown as revegetated and others are not. Provide revised sheet with note indicating that the Corps of Engineers is requiring that the sewer easement will not be revegetated.

Provide revised sheet correcting hatching error for the replacement drainage channels buffer areas that will be graded. This area should be in darker (cleared and revegetated areas) hatch.

Sheet L5.1: Provide revised sheet with note that says that if 8<sup>th</sup> Avenue South is not needed for access it will be revegetated.

Sheet L5.2: Provide revised sheet with note indicating that any irrigation installed in the field shall be shown on the As-Built Report.

Sheet L6: Areas that are cleared and revegetated should be planted at a higher density than enhancement areas. Densities or quantities should be stated on the plan. A performance standard of 280 trees per acre is proposed for the buffer. In cases where some forest vegetation is present, the Port shall supplement the existing trees with enhancement plantings to achieve this density. Clarify in NRMP how survival monitoring will be performed in these areas to differentiate these two types of areas.

Provide revised plan detail/notes to allow for use of phased planting in areas that lack suitable shade or soil moisture. Discuss in text of NRMP.

On tree planting and staking detail, the plan needs to state when the stakes will be removed. If it is determined that staking is not necessary then remove the stake details. Provide revised sheet.

Sheet P2: Provide revised sheet showing approximate locations of the sandbags and the abutments to be removed. Provide note on TESC controls that will be in place for the timber removal in order to minimize sediment mobilization.

#### **Appendix D – Replacement Drainage Channels and Restoration of Temporarily Impacted Wetlands**

Sheet C3: Clarify how hydrologic support will be provided to Wetland 11 and Wetland 9 after construction.

Sheet C5: Provide revised plan sheet with details regarding flow spreaders and spalls.

Sheet C6: Provide revised sheet clarifying whether the dark hatched area in the vicinity of Wetlands R9a, R10, R11, A10, and A11 will be graded and revegetated.

Sheet C7: Show how will water get to Wetland 44a if the TESC channel is removed.

Show flow monitoring locations on the stormwater management plan.

Sheet C8: Clarify how the drainage channel discharge structure controls flow to the wetland. Address how often these structures will be monitored and how modifications be made if a problem is identified. Provide information in note on revised sheet.

Sheet L1: Provide revised sheet to allow for phased planting to provide shading for western red cedar and the western hemlock.

#### **Appendix E – Auburn Wetland Mitigation**

Sheet C5: Provide revised sheet with note saying that if hummocks remain in place options for removing reed canary grass will be evaluated.

The Sheet C6 grading plan shows proposed contours for re-grading the SW portion of the mitigation site. These contours do not continue onto Sheet C5. Provide revised sheet.

Sheet C8: Provide revised sheet with a note added to the plans to include culverts at the low spots if needed to eliminate ponding.

On Section 3, design to ensure the perforated pipes do not sink into the substrate and become blocked.

Sheet TE1: There is no discussion on dewatering except in the NRMP text on page 7-50. Sheet C2 (Appendix E) shows the discharge point located along a ditch, which is slated to be recontoured. Provide revised sheet with additional details to manage potential erosion and amend text in NRMP if necessary.

If it is determined that Area 1 should have a sedimentation pond submit revised sheet showing the pond.

Page 7-47 of the text discusses major construction activities limited to a period from October 31 to March 31 to avoid winter bald eagles. Provide revised sheet correcting error regarding construction window to avoid winter bald eagles.

Sheets L7 and L8: Provide revised sheets to show plant pattern layout areas for each phase.

Sheet L9: Provide revised sheet with a note added to the plans so that ponded areas or areas that are anticipated to be ponded shortly after planting will be planted with plugs representative of the seed mix specified. Add Hydro seeding specifications.

#### Revised Auburn Grading Plan (June 28, 2001):

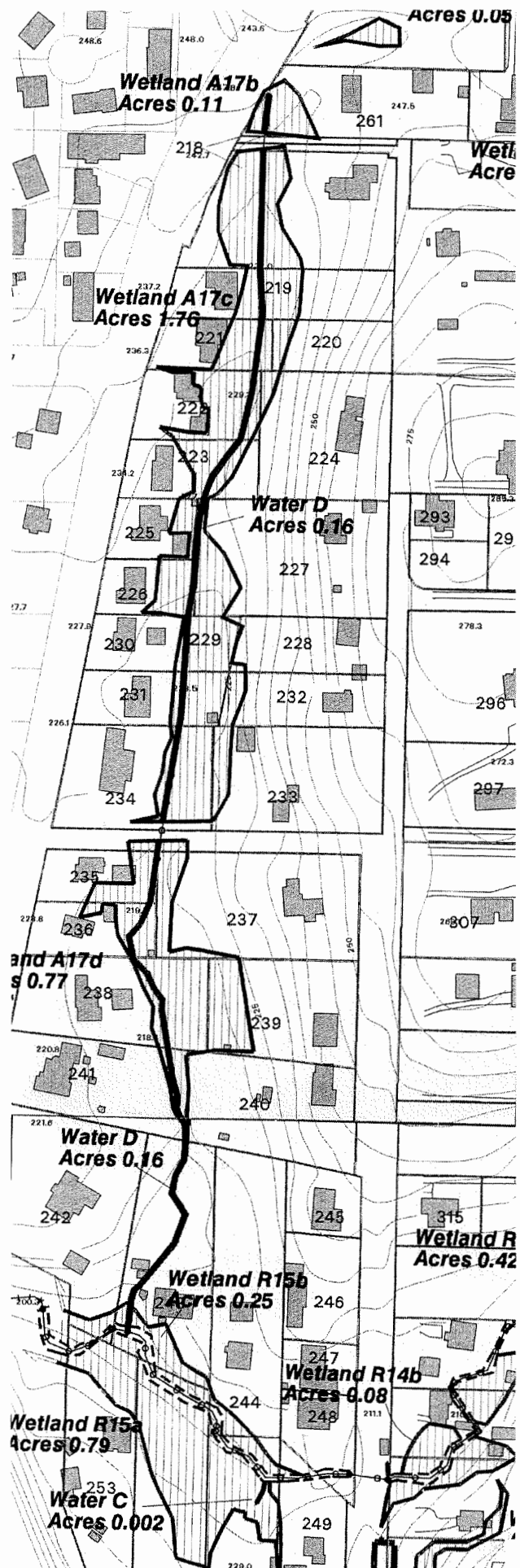
1. The revised grading plan (June 28, 2001) shows a culvert in the northwest corner of the site in the proposed new drainage swale. The culvert will pass flows under the site access path. The drawing shows this culvert approximately 60 feet long, passing under a path that is only approximately 15 feet wide. This culvert should be no longer than is necessary to pass the water under this pathway.
2. The revised grading plan (June 28, 2001) shows a culvert in the south central portion of the mitigation site. This culvert appears to be mis-located. It appears that the culvert should be shown in the wetland directly east of the shown location, where the wetland passes under the



proposed maintenance path. This culvert should be no longer than is necessary to pass the water under this pathway.

3. Two additional culverts need to be shown along the new drainage swale where the water outlets the southwestern basin, under the maintenance pathway.
4. Culverts should be placed during construction under the paths/roads in all areas where there is a potential for impounding water. A note should be added on the construction documents.
5. Provide revised grading plan that addresses items 1 through 4 above.

Attachment C  
 1996-4-02325  
 (Amended-2)  
 June 7, 2004  
 Wetland A17 Complex



June 7, 2004

ATTACHMENT D

Borrow Area 3 Wetland and Swale Buffer



## **Attachment E**

### **SECTION 401 CERTIFICATION SYNTHETIC PRECIPITATION LEACHING PROCEDURE WORK PLAN**

This Work Plan provides an alternative methodology for meeting the fill suitability criteria found in Section E.1(b) of the Department of Ecology's Water Quality Certification #1996-4-02325 (the "Certification") issued to the Port of Seattle ("Port"). This Work Plan describes procedures for use of the Synthetic Precipitation Leaching Procedure ("SPLP") to determine the suitability of fill for the Port's third runway embankment and other Port projects for which the fill criteria of the Certification are applicable (defined in the Certification as "Port 404 Projects").

#### **I. Summary of Requirements**

Requirements applicable to the Port include those of the Certification and also those contained in the U.S. Fish and Wildlife Service's ("FWS") May 22, 2001 biological opinion ("BO") (FWS Reference Number 1-3-00-F-1420). The Ecology Certification and the FWS BO both have screening level criteria for Port 404 Projects, including the third runway embankment (the "Embankment"), as well as special screening criteria that apply to a zone of material above the drainage layer at the bottom of the embankment. Special criteria for this zone (referred to as the "drainage layer cover" in the BO and in this document) are applicable to a zone that is 40 ft thick at the face of the embankment and reduces in height to the east at a rate of 2 percent until it meets the drainage layer at the existing ground surface to the east.

Table 1 shows the soil criteria that have been developed for the third runway embankment by FWS and Port 404 Projects by Ecology. Ecology's Certification specifies soil criteria for 14 metals and TPH (column 5 – the last column on the right). In addition, the Certification soil criteria for chromium, lead, nickel, and diesel in the drainage layer cover of the Embankment are more stringent than for the rest of the Embankment and other Port 404 Projects (column 2). The FWS BO specifies soil criteria for the drainage layer cover as shown in column 3 for the RCRA 8 metals. Because the FWS and Ecology soil criteria differ, the Port will use the most stringent criteria of the two for the drainage layer cover (shown in column 4) and for the remainder of the Embankment (shown in column 5).

Because metals are naturally occurring, they have widespread concentration variability throughout the Pacific Northwest. Many of the soil criteria in Table 1 are at Puget Sound background concentrations calculated at the 90<sup>th</sup> percentile. Thus, by definition a constituent, even at a naturally-occurring, unaltered concentration will fail these criteria 10% of the time. When testing is done for multiple constituents, the probability that naturally-occurring concentrations will disqualify a fill source rises. For fill constituents that do not meet the screening criteria of the Certification and BO, fill acceptability can be demonstrated using the SPLP test procedure.



In accordance with the BO, upper bounds are established for constituent concentrations that cannot be accepted even following a successful SPLP test (referred to in this document as “upper bound limits”). For the drainage layer cover, the upper bound limits are set in the BO at applicable MTCA Method A standards. However, Method A values were not available for barium, selenium and silver. As a result, the upper bound limit for barium was backcalculated using the MTCA three phase partitioning approach (WAC 173-340-747) and selenium and silver soil criteria were set at the PQL. Upper bound limits for the drainage layer cover and the remainder of the Embankment are incorporated into this Work Plan to avoid any potential inconsistency with the BO. As such, any material that is unacceptable for the Embankment under the BO is also unacceptable for the Embankment under this Work Plan and the Certification.

At proposed fill sources for which sampling is required in accordance with the Certification, the appropriate number of samples of proposed fill material (per Certification requirements) will be collected and analyzed for the constituents listed in Condition E.1(b). Constituent concentrations will be compared to the lower screening criteria in Condition E.1(b) and in the BO for the drainage layer cover (Table, 1, column 4) or for the rest of the embankment (Table 1, column 5). If the screening criteria are not exceeded, fill from that source will be considered suitable for placement in the appropriate portion of the embankment, or on other Port 404 Projects. If the screening criteria are exceeded, but the upper bound limits are not exceeded, the Port must demonstrate fill suitability by employing the SPLP testing protocol discussed below prior to accepting fill from that source.

## **II. SPLP Testing Protocol**

The purpose of the SPLP is to evaluate the potential for metals and organic constituents to mobilize and move through soils in fluid form. The SPLP is an accepted laboratory leaching test, as discussed in WAC 173-340-747(7). The SPLP will be conducted in accordance with the procedures contained in SW-846 Method 1312. In the SPLP, fluid representing acid rain is passed through a soil sample and the liquid is collected and analyzed.

SPLP testing will be conducted and the results will be evaluated relative to the applicable ambient water quality criteria of WAC 173-201A and the ground water quality criteria of WAC 173-200, as discussed below. In the event that SPLP results consistently show that criteria for specific metals are not exceeded across a range of sites and soil conditions, the Port may elect to submit such information to Ecology for its review as evidence that the Port may discontinue the requirement to implement SPLP for specific metals. Upon approval by Ecology, the Port may then adopt the applicable upper bound limit, or some intermediate figure as determined by Ecology, as its new soil screening criterion for that constituent.

Use of SPLP to demonstrate fill acceptability will require sampling of the material proposed as imported fill. At a minimum, one SPLP sample will be collected for each original sample that exceeds the screening criteria. This sample will be representative of the area where the original sample indicating an exceedence of the screening criteria was collected. The SPLP will only be conducted for the specific chemical constituent that exceeds the criteria.

### **III. Screening Procedure**

Results from the SPLP will be compared to freshwater ambient water quality criteria according to guidelines outlined in WAC 173-201A-040 and the ground water quality criteria in WAC 173-200-040 (adjusted for PQLs). As an initial screening tool, the constituent concentrations as determined from the SPLP will be divided by a dilution factor of 20. The default dilution factor of 20 was established by Ecology for use in the Three Phase Partitioning Model (WAC 173-747). This dilution factor represents a very conservative estimate because it accounts only for the dilution that occurs between the pore water at the spot in the embankment where the constituent exceeded water quality criteria, and ground water in the saturated zone directly below, without accounting for attenuation processes. The actual dilution factor, first from a specific point in the embankment through the underlying drainage layer and then transport to Miller Creek, is much greater. If the adjusted SPLP results are equal to or below the freshwater ambient water quality criteria and the ground water quality criteria, the material will be considered suitable for placement in the embankment (including the drainage layer cover, provided applicable upper bound limits were not exceeded for any constituents in the initial soil test prior to SPLP use). If adjusted SPLP results are above freshwater ambient water quality criteria or ground water quality criteria, the material will be rejected and will not be considered suitable for placement at any location within the embankment.

June 7, 2004

## Attachment E/SPLP Workplan Table 1

**Table 1**

Criteria for Drainage layer cover and other Port 404 Projects.

Constituent	Ecology special criteria for drainage layer cover (mg/kg)	FWS drainage layer cover criteria (mg/kg)	Final drainage layer cover criteria (most conservative of FWS and Ecology values) (mg/kg)	Ecology criteria for remainder of embankment and other Port 404 Projects (mg/kg)
Antimony		NA	16	16
Arsenic		7	7	20
Barium		12,000	12,000	NA
Beryllium		NA	0.6	0.6
Cadmium		1	1	2
Chromium	42	48	42	2000
Copper		NA	36	36
Lead	220	24	24	250
Mercury		0.07	0.07	2
Nickel	100	NA	48	110
Selenium		5	0.75	0.75
Silver		5	0.28	0.28
Thallium		NA	2	2
Zinc		NA	85	85
TPH	0 (a)		0 (a)	0 (a)

(a) The limit of 0 means nondetectable, as determined by Ecology.

# DEPARTMENT OF THE ARMY PERMIT

**Permittee:** Port of Seattle

Port of Seattle  
17900 International Boulevard, Suite 402  
Seattle-Tacoma International Airport  
SeaTac, Washington 98188-4236

**Permit No:** 1996-4-02325

**Issuing Office:** Seattle District

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (Corps) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

**Project Description:** Permanently impact 19.62 acres of wetlands and temporarily impact 5.51 acres of wetlands on-site and 23.27 acres of wetlands at Auburn for the construction of an 8,500 foot third runway, two Runway Safety Areas (RSA), the South Aviation Support Area (SASA), the mitigation both on-site and at Auburn, the relocation of South 154<sup>th</sup>/156<sup>th</sup> Way, the discharge of fill material in Borrow Area 1 and the upgrade of an existing gravel haul road (located northeast of Borrow Area 4) in accordance with the plans and drawings attached hereto which are incorporated in and made a part of this permit. Up to 980 linear feet of Miller Creek will be filled and relocated. Drainage channels in the Miller Creek basin (1,290 linear feet) and in the Des Moines Creek basin (100 linear feet) will also be impacted (to meet the public need for an efficient regional air transportation facility to meet anticipated future demands).

**Project Location:** In the Miller Creek, Walker Creek, and Des Moines Creek watersheds and in wetlands at Seattle-Tacoma International Airport (STIA), located within and in the vicinity of the City of SeaTac, King County, Washington, and in wetlands at the mitigation site in Auburn, King County, Washington.

## **Permit Conditions:**

### *General Conditions:*

1. The time limit for completing the work authorized ends on DEC 13 2009. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in accordance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification to this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.



5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

7. After a detailed and careful review of all the conditions contained in this permit, the permittee acknowledges that, although said conditions were required by the Corps, nonetheless the permittee agreed to those conditions voluntarily to facilitate issuance of the permit; the permittee will comply fully with all the terms of all the permit conditions.

*Special Conditions:*

a. You must provide a copy of the permit transmittal letter, the permit form, and drawings to all contractors performing any of the authorized work.

b. The stormwater BMPs for better removal of dissolved metals, shall be selected from the Enhanced Treatment Menu found in August 2001 edition of the *Stormwater Management Manual for Western Washington*.

c. The Port shall sample stormwater above and below stormwater outfalls and monitor the hardness of the receiving waters (Miller, Walker, and Des Moines creeks).

d. The Port will perform the water quality toxicity testing on specific sensitive organisms. These organisms and testing protocols will be approved by Ecology prior to testing. Testing shall measure injury, as well as mortality of those organisms.

e. 100% of the stormwater management facility retrofit shall be completed by the time 50% of the paved impervious surfaces have been constructed. Status reports will be provided to U.S. Army Corps of Engineers, Seattle District, Regulatory Branch, every 6 months from the date of permit issuance documenting the amount of paved impervious surface constructed and the amount of retrofitting completed until the 100%/50% goal is reached.

f. The *Natural Resource Mitigation Plan, Master Plan Update Improvements, Seattle-Tacoma International Airport* (NRMP) dated November 2001 with the corrections dated January 2002, February 2002, and November 2002, will be implemented. The dates for the submittals of as-built drawings and monitoring reports are as described in the table titled "Reporting schedule for mitigation projects during the 15-year monitoring period". Year 0 is the year the as-built drawings are approved by the U.S. Army Corps of Engineers in writing.

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**Reporting schedule for mitigation projects during the 15-year monitoring period.**


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Mitigation Project	Monitoring Year															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Des Moines Way Nursery Site	□	■	■	■	◆	■	◆	■	◆	◆	■		■			■
Vacca Farm	□	■	■	■	■	■	◆	■	◆	◆	■		■			■
Miller Creek Relocation	□	■	■	■		■		■			■		■			■
Miller Creek Buffer	□	■	■	■		■		■			■		■			■
Stream Enhancement	□	■	■	■		■		■			■		■			■
Replacement Drainage Channels	□	■	■	■	■	■		■		■			■			■
Tyee Valley Golf Course	□	■	■	■		■		■		■	■		■			■
Restoration of Temporary Impacts	□	■	■	■	◆	■	◆	■	◆	◆	■		■			■
Monitoring for Indirect impacts	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Auburn Wetland Mitigation	□	■	■	■	◆	■	◆	■	◆		■		■			■
Contingency Actions	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣	▣

□ - As-built (record) survey and report. Submitted within 60-days of construction and planting.

■ - Detailed monitoring reports. Submitted by December 31<sup>st</sup> of each monitoring year. Monitoring reports for each project will be combined into a single document.

◆ - Hydrologic monitoring only.

⊙ - Monitoring and reporting follows requirements of the 401 Water Quality Certification.

▣ - Additional monitoring requirements or limited interim reporting may be required of any project if contingency actions are taken.

g. Water will be released from the low-flow vaults as described in the *Low Streamflow Analysis* dated December 2001 and at the rates as specified in Table 4-2 of the *Low Streamflow Analysis*, or as subsequently modified and approved by the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch. Documentation of this release will be included in the monitoring reports described in the NRMP.

h. The minimum number of test samples of the proposed fill shall be increased to reflect the number of samples required under MTCA.

i. The monitoring in Condition F(1) of the Section 401 Water Quality Certification is modified so that monitoring continues for as long as there are contaminants in the Airport Operations and Maintenance Area (AOMA).

j. A water right to use the water stored in the low-flow vaults for mitigation of low flow impacts in Walker Creek must be obtained before commencing paving of the third runway and the associated new taxiways west of the coordinates listed below. A water right to use the water stored in the low-flow vaults for mitigation of low flow impacts in Des Moines Creek must be obtained before commencing construction of the SASA building and associated paving. A copy of the water right(s) will be provided to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch prior to commencing paving and/or construction of the SASA building.

<u>Taxiway</u>	<u>Coordinate</u>
A	E12230
E	E12230
J	E12230
N	E11990
P	E12000
Q	E12230

k. A professional archaeologist must be on-site to monitor for the presence of archaeological resources during all ground disturbing construction within the channel excavation area at Vacca Farm and western portion of the Tyee Valley Golf Course areas. The archaeological monitoring plan prepared by Larson Anthropological Archaeological Services Limited, dated June 7, 2001, must be implemented in its entirety.

l. A summary report of the findings of the archaeological monitoring or status report must be submitted to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch within 13 months of permit issuance and yearly thereafter until construction in these areas have been completed.

m. If human remains or archaeological resources are encountered during construction, all ground disturbing activities shall cease in the immediate area and the permittee shall immediately (within one business day of discovery) notify the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch (Corps), Federal Aviation Administration and the State Historic Preservation Officer. The permittee shall perform any work required by the Corps in accordance with Section 106 of the National Historic Preservation Act and Corps regulations.

n. You must implement and abide by the ESA requirements and/or agreements set forth in the *Biological Assessment, Master Plan Update Improvements, Seattle-Tacoma International Airport*, dated June 2000, in its entirety. The U.S. Fish and Wildlife Service (USFWS) concurred with a finding of "may affect, not likely to adversely affect" based on this document in a Biological Opinion (BO) dated May 22, 2001 (USFWS Reference Number 1-3-96-I-29, 1-3-99-SP-0744). The BO contains mandatory measures that are incorporated by reference in this permit. The National Marine Fisheries Service (NMFS) concurred with a finding of "may affect, not likely to adversely affect" based on this document on May 31, 2001 (NMFS Reference Number WSB-00-318). Both agencies will be informed of this permit issuance. Failure to comply with the commitments made in this document and as described in the USFWS BO constitutes non-compliance with the ESA and your Department of the Army permit. The USFWS and/or NMFS are the appropriate authority to determine compliance with ESA.

o. Both the onsite and offsite wetland mitigation areas created, enhanced, and/or restored as mitigation for work authorized by this permit, shall not be made the subject of a future individual or general Department of the Army permit application for fill or other development, except as permitted in the restricted covenants found in Appendix G of the mitigation plan or for the purposes of enhancing or restoring the mitigation associated with this project. These covenants will be recorded with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records to or interest in real property. Proof of this documentation must be provided to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch within 90 days of permit issuance.

p. No irrigation can be performed in any mitigation area for more than 3 consecutive years without written approval from the U.S. Army Corps of Engineers (Corps). No irrigation may be performed after Year 4 in any mitigation area without written approval from the Corps.

q. The timing of the riparian buffer enhancement plantings (the area extending a horizontal distance of 100 feet from the OHWM of the stream or from the edge of riparian wetlands, whichever is greater) along Des Moines Creek will be coordinated with the construction schedule of the regional detention facility and will be planted no later than the end of 2007, without prior written approval of the U.S. Army Corps of Engineers.

r. All of the "Delineated Wetlands Verified by ACOE" as shown on Sheets 3 and 4 of the permit drawings that are not being filled as part of this permit will be redelineated in mitigation monitoring years 5, 10, and 15. For those wetlands where the NRMP proposes to expand or otherwise modify the existing wetland boundaries, the post mitigation construction wetland boundaries must be delineated to insure the area of the new wetlands at least equals the proposed NRMP wetland area. Maps will be included in the yearly mitigation monitoring report and provided to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch. If the size of any of the wetlands have decreased, additional mitigation may be required. There is one exception to this condition: 1) The boundary of Wetland 43 will not be redelineated because there are no anticipated indirect impacts.

s. To monitor for the occurrence of any unforeseen indirect impacts and to identify potential adaptive management strategies, the monitoring protocols outlined in the memorandum titled *Changes to groundwater monitoring protocol in wetlands adjacent to Master Plan Construction Projects* dated October 28, 2002 will be implemented. Results of the monitoring will be included in the yearly mitigation report and provided to the U.S. Army Corps of Engineers, Seattle District, Regulatory Branch.

**Further Information:**

1. Congressional Authorities. You have been authorized to undertake the activity described above pursuant to:
  - ( ) Section 10 of the Rivers and Harbor Act of 1899 (33 U.S.C. 403).
  - (X) Section 404 of the Clean Water Act (33 U.S.C. 1344).
  - ( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).
2. Limits of this authorization.
  - a. This permit does not obviate the need to obtain other Federal, State, or local authorization required by law.
  - b. This permit does not grant any property rights or exclusive privileges.
  - c. This permit does not authorize any injury to the property or rights of others.
  - d. This permit does not authorize interference with any existing or proposed Federal project.



3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

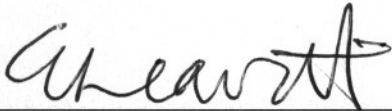
5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of the permit.
- b. The information provided by you in support of your application proves to have been false, incomplete, or inaccurate (See 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

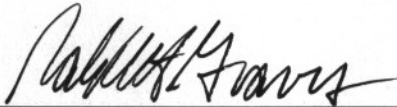


PORT OF SEATTLE

12.13.02

(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.



RALPH H. GRAVES  
Colonel, Corps of Engineers  
District Engineer

13 Dec 02

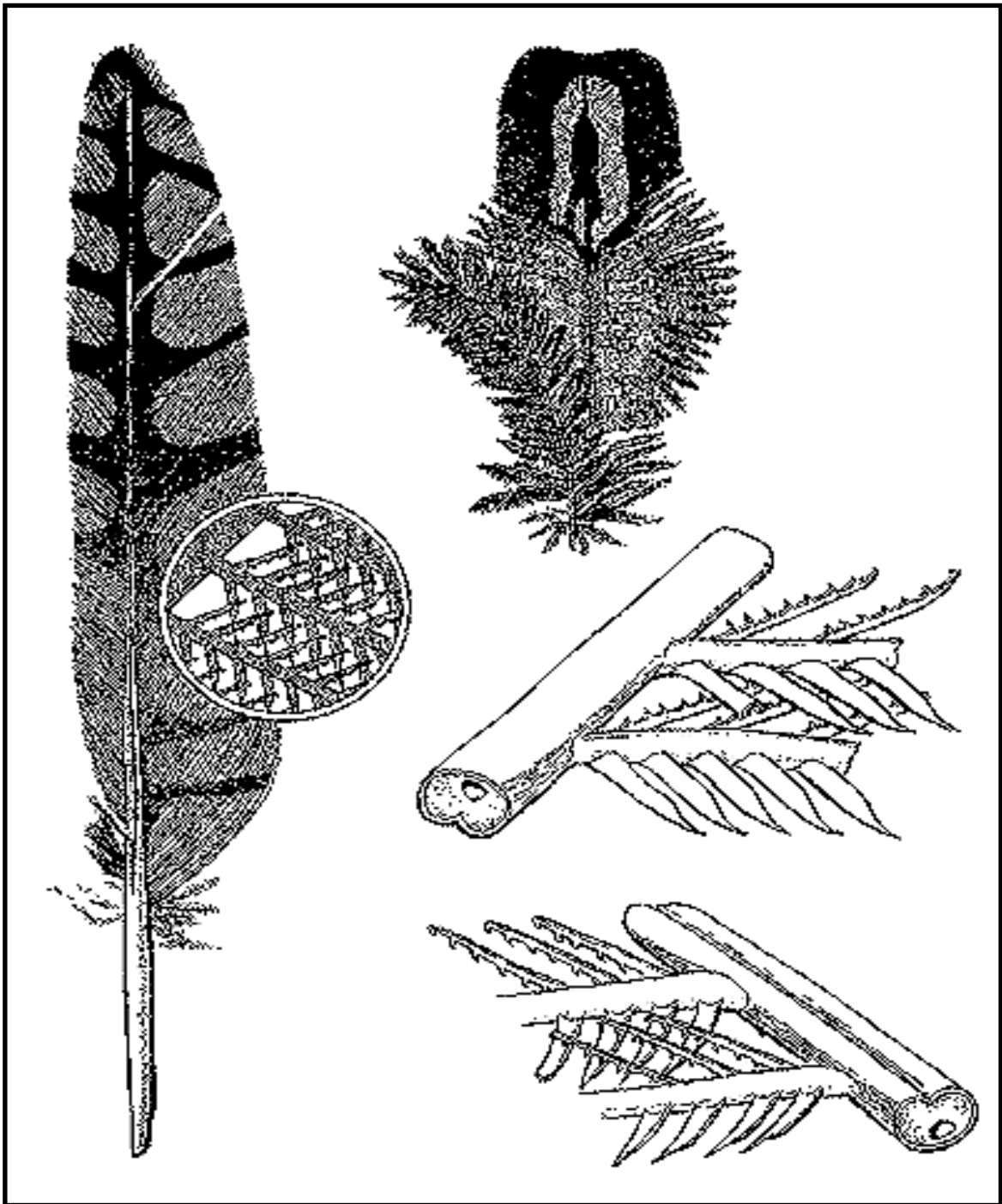
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFeree)

(DATE)





The feather microstructure or a “snarge” sample can greatly assist with the positive identification of a bird involved in a strike. Even a single feather or a small blood smear (snarge) is worth sending to the Smithsonian Institution, Washington D.C. for identification.

**REMEMBER, “Bag it, Tag it, and Freeze it”**

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Original Date: \_\_\_\_\_

FAA Approval: \_\_\_\_\_

Revision Date: \_\_\_\_\_