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TRASH AND WATER: MANAGING ON-AIRPORT WILDLIFE ATTRACTANTS AT PAINE FIELD, WASHINGTON

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ABSTRACT

Identifying and addressing land uses on or near airports that attract wildlife hazardous to aviation, such as refuse and water management facilities, is an important component of an integrated approach to reduce wildlife-aircraft collisions. Similar to most airports, Snohomish County Airport (Paine Field) has recently been involved with construction of on-airfield stormwater management structures. In addition, Snohomish County built a new trash-transfer facility on airport property during 2002-2003. The airport, USDA Wildlife Services, and the Federal Aviation Administration (FAA) provided considerable input into the design and landscaping around the transfer facility and in the redesign of a stormwater detention pond/wetland to minimize their attractiveness to hazardous wildlife. The number of blackbirds, American crows, and songbirds using the transfer station and site after the facility opened (during 2004) was reduced by 96%, 7%, and 63%, respectively, compared to when the site was an undeveloped grass field (during 2001). The 5.1-ha on-airfield water detention structure was heavily utilized by waterfowl prior to modification. In fall 2001, the stormwater pond/wetland was re-graded, a manually controlled spill valve was added to the existing outflow channel, and approximately 32,500 woody plants (e.g., willow) were planted within pond. During 2004, red-winged blackbird use was 30% higher, whereas duck and Canada goose use was 96% and 84% lower, respectively, than during 2001 (prior to the habitat modifications). Management efforts to reduce the attractiveness of these two on-airfield attractants appeared to be effective at Paine Field.

INTRODUCTION

Although the civil and military aviation communities widely recognize that the threat to human health and safety from aircraft collisions with wildlife (wildlife strikes) is increasing (Dolbeer 2000, MacKinnon et al. 2001), it has been demonstrated that elimination of wildlife habitat and attractants on or near airports will reduce wildlife strikes (Cleary et al. 2004). Habitat management is the most effective long-term measure for reducing wildlife hazards on or near airports (USDA 1998, Washburn and Seamans 2004).

Snohomish County Airport (hereafter referred to as Paine Field) is located in Everett, Washington, approximately 25 miles north of Seattle. It is a Federal Aviation Administration (FAA) certificated, non-commercial airport averaging 180,000 aircraft movements per year. The 526 ha airfield has 570 based aircraft and air-traffic is comprised of 95% general aviation and 5% heavy aircraft operations. Like all airports,

Paine Field addresses many unique wildlife hazard issues, two of which include a man-made wetland/storm-water pond (hereafter referred to as Swanson wetland) and the Airport Road Recycling and Transfer Station (ARTS; Figure 1).



Figure 1. Locations of Swanson Wetland, Wetland 25, and ARTS at Paine Field, Washington.

In the fall of 1998, Swanson wetland was created to mitigate for wetland impacts from runway improvements and other construction activities. Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5200-33A states that, “Mitigation must not inhibit the airport operator’s ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided”. The FAA also recommends that wetland mitigation projects that might attract hazardous wildlife should be sited outside of the separation distances (U. S. Department of Transportation 2004). As this project could not effectively be constructed out of basin or the separations identified in the AC, Paine Field worked with stormwater and wetland engineers, the FAA, and the U. S. Department of Agriculture, Wildlife Services (USDA WS) to design this mitigation project such that it would comply with the FAA AC. Considerable effort and numerous consultations were conducted to ensure there was not an increase in hazardous wildlife attracted to the site.



Figure 2. Photograph of the newly constructed and operational Airport Road Transfer Station at Paine Field, Washington.

The ARTS facility is fully enclosed, accommodates the disposal of household refuse and recycling, and the entire site encompasses approximately 4-ha (Figure 2). Construction of the ARTS facility began in August of 2001 and concluded in September of 2003; the facility became operational in October of 2003. Extensive monitoring of the ARTS site was conducted prior to, during construction, and since ARTS has been in operation to determine if wildlife hazardous to aviation are being attracted to the site.

The goal of this study was to evaluate whether the design and management of on-airfield land uses (Swanson and ARTS) at Paine Field was effective in reducing their attractiveness to wildlife hazardous to aviation.

METHODS

Habitat/Site Management

Swanson Wetland

As part of a wetland mitigation project, Swanson wetland was created in the fall of 1998 to compensate for wetland impacts from developments occurring on other areas of Paine Field. The preferred location was underneath the approach/departure pattern of Runway 16R-34L. Because of its close proximity to the approach and departure pattern of the airport's busiest runway, the goal was to produce a functioning scrub-shrub



Figure 3. Photo of Swanson Wetland in November 2004, at Paine Field, Washington.

wetland with a dense, vegetative canopy so waterfowl would not be attracted to large expanses of open water (Figure 3). Approximately 41,500 plants of 34 different species were installed, including but not limited to: willow, dogwood, twinberry, ninebark, rose, salmonberry, spirea, and snowberry. These plants were 1- or 2-gallon in size and spaced 3' to 5' on center. After construction concluded in the fall of 1999, it was quickly determined that the wetland was improperly graded, leaving deep, open water that could attract waterfowl and did not comply with initial design. As a result, much of the installed vegetation either died or did not establish due to poor site conditions. In the winter of 2001 major revisions of the site took place, including:

- Grading of the higher elevation areas and re-grading of the outlet channel to allow for proper drainage.
- Back-filling of the water-inundated areas so water depth would not exceed 18 inches.
- Re-planting approximately 32,000 plants including, but not limited to: willow stakes and 1- or 2-gallon spirea, rose, salmonberry, twinberry, and cottonwood. All plants were spaced 3' to 5' on center.
- Adding a manually controlled spill valve in the outflow channel that could be opened if water depth exceeded 18 inches.

Airport Road Recycling and Transfer Station (ARTS)

In 2000, the Snohomish County Public Works Division, with the requested assistance of FAA, USDA WS, and Paine Field staff, began planning the construction of a fully enclosed trash-transfer facility on an undeveloped area of airport property. FAA Advisory Circular 150/5200-33A clearly identifies that “[Fully] enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ)”. Rather than construct the facility adjacent to the airfield but off airport property, where Paine Field would have no direct influence over its design or functionality, a Memorandum of Understanding (MOU) between Snohomish County Public Works and Paine Field was developed to allow the ARTS to be located on airport property. This MOU addressed potential wildlife issues that could arise as a result of the ARTS. Within the MOU, Snohomish County Public Works acknowledged that wildlife, particularly birds, pose a safety hazard to airport operations and that all measures necessary will be taken to prevent wildlife attractions during the construction and operation of the transfer station. In the event that ARTS attracts wildlife hazardous to aviation, Snohomish County Public Works shall immediately remove the attractant and cooperate fully with Paine Field, the FAA, and USDA WS to alleviate wildlife hazards associated with the site.

Additionally, and more specifically, the MOU stated that Snohomish County Public Works would design the facility, install the following items, and implement the following procedures to reduce wildlife attractants:

- Mechanisms such as grates will be installed to prohibit garbage from being tracked out of the transfer station.
- Spikes, exclusionary wires, or other bird deterrent devices will be installed on the building and light posts, per recommendation of Paine Field or USDA WS.
- Garbage shall be washed off all vehicles inside the transfer station.
- Stormwater shall be detained in vaults.
- At a minimum, Snohomish County Public Works will inspect the site three times a day for foreign object debris (FOD). Roads approaching the site shall be inspected at least twice a day for FOD. All inspections shall be documented and records kept at the site.
- Landscaping installed on the premises shall not attract wildlife. The Airport Director and USDA WS shall approve all landscaping plans.
- Existing rules, that all customers have their loads enclosed within their vehicles or contained by tarps, netting, or other covers, will be strictly enforced.
- Odor and residence time of solid and liquid waste at the facility shall be minimized.
- No putrescible waste will be handled or stored outside in an open container at anytime, for any reason, or in a partially enclosed structure accessible to wildlife.

- Public Works shall disclose and deliver to Paine Field copies of any wildlife reports, tests, studies or other documentation relating to any investigation of the premises for wildlife.

Any site recommendations, from Paine Field representatives or USDA WS, shall be promptly reviewed and implemented by Snohomish County Public Works. In the event Snohomish County Public Works is unable to control wildlife hazards to the satisfaction of Paine Field, the transfer station will be closed until the hazard condition no longer exists.

Data Collection and Analysis

All data used in this study were derived from standardized surveys recorded by USDA WS (Paine Field contracts with USDA WS to provide a full-time Wildlife Damage Biologist) and Paine Field personnel during 2001-2004. Standardized surveys were conducted twice per week using “point count” methods. All wildlife observed within the designated plot during a 3-minute sampling period were counted. The time, location, number of individuals, activity, direction of movement, and cover type used were recorded. The time of day of each survey was varied randomly to identify potential peak periods of wildlife activity. Because the number of surveys varied monthly and yearly, all data were standardized (number of birds observed per minute of observation). All data were recorded and compiled in the Airport Information Manager (AIRMAN®) database program.

RESULTS

Swanson Wetland

In 2001, before major revisions to the site transpired, 0.4 birds/min were observed using the Swanson site (Figure 4). During 2002 and 2003, when shrubby vegetation was minimal but present, 0.5 and 0.7 birds/min were observed, respectively. Birds using the Swanson wetland during these 2 years were predominantly ducks

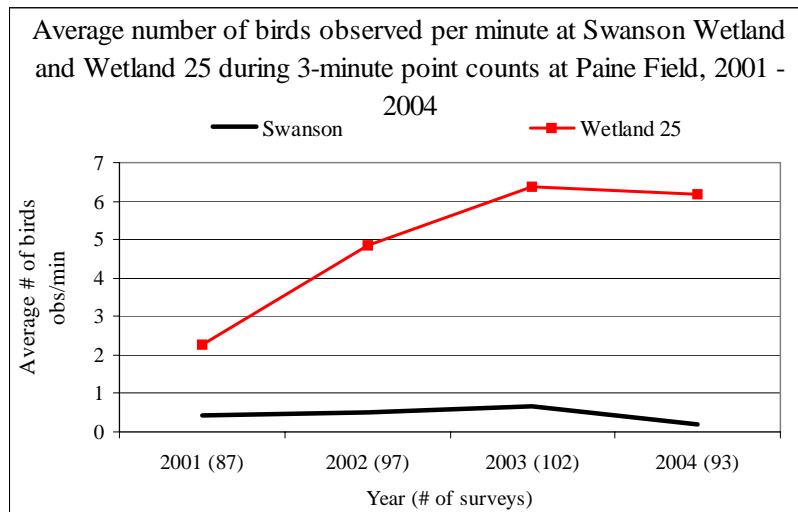


Figure 4. Average number of birds observed per minute at Swanson Wetland and Wetland 25 during 3-minute point counts at Paine Field, 2001 - 2004

and some red-winged blackbirds. In 2004, following the establishment of a mature vegetation stand, bird use declined to 0.2 birds/min (annual total of 46 red-winged blackbirds, 3 ducks, and 2 Canada geese).

As the vegetation in Swanson wetland became more established over time, we hypothesized that conditions would become more favorable to red-winged blackbirds and expected their use of the site to increase. Although overall red-winged blackbird use of the site did increase, this change was relatively small (total of 33 individuals observed in 2001 compared to 46 individuals observed in 2004).

Waterfowl (ducks and geese) use of Swanson during 2004 (0.02 to 0.03 birds/min) was 94% less than during 2001. Also noteworthy was that as waterfowl use decreased at Swanson from 2001 to 2004, waterfowl use increased by 174% on an adjacent pond¹ with larger areas of open water (Figure 5).



Figure 5. Photograph of Wetland 25 (adjacent to Swanson wetland), taken during February 2002, at Paine Field, Washington.

Airport Road Recycling and Transfer Station (ARTS)

Prior to the development of ARTS, the site was an undeveloped grass field. During 2001, we observed 3.3 birds/min., consisting mostly of blackbirds (2.8 birds/min) and killdeer/swallows (0.5 birds/min; Figure 6). Following the construction of ARTS and during its first year of operation (2004), bird use of the ARTS (0.5 birds/min) was 86% lower than when the site was an undeveloped grassland (2001). Twelve American crows, thirty-three blackbirds, forty-one Canada geese, twenty-six killdeer, two red-tailed hawks, and twenty barn swallows were observed at ARTS during 2004. Ninety-two of the observations were related to feeding activity associated with short grass landscapes, whereas the other forty-two observations were either loafing or flying. No observations of bird feeding on refuse or debris were recorded.

¹ The adjacent pond is referred to as Wetland 25. This 19-acre, naturally occurring pond is adjacent to Swanson wetland, but not directly under the approach/departure pattern of runway 16R-34L.

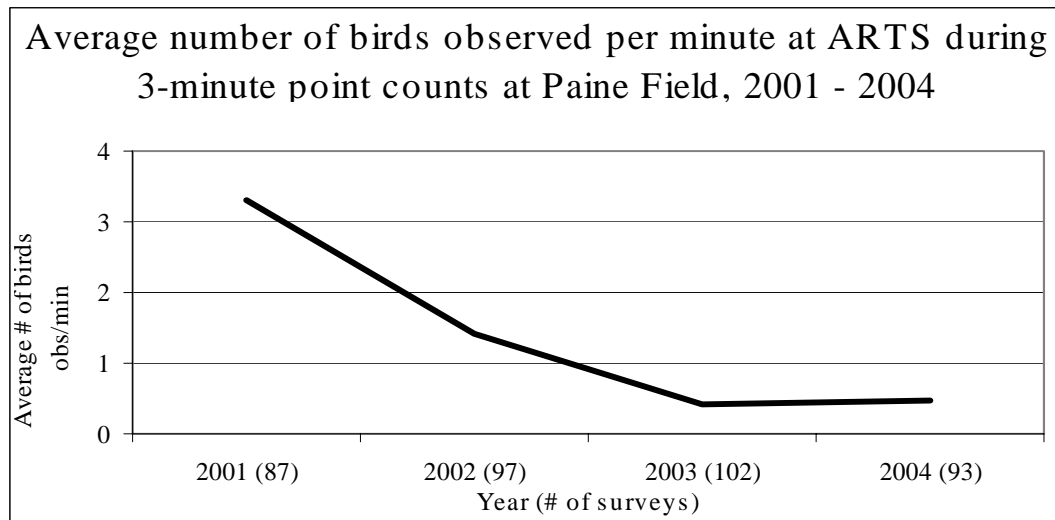


Figure 6. Average number of birds observed per minute at ARTS during 3-minute point counts at Paine Field, 2001 - 2004.

DISCUSSION

Swanson Wetland

Waterfowl are hazardous to aircraft operations because of their size, weight, abundance, and flocking behavior (Blokpoel 1976, Dolbeer et al. 2000). All practical and effective measures available should be taken to dissuade them from utilizing the airport environment. Waterfowl can be discouraged from using a pond by making it and the surrounding area unattractive to them (Cleary 1994). This was accomplished at Swanson wetland by eliminating open water, densely planting shrub-scrub vegetation, properly grading the area to maximize water dispersal, and controlling water depth by manually spilling water during times of large rain events or high volumes of stormwater runoff.

As with any type of habitat modification, deterring one or more species from one location might result in a net increase in use by these species at an adjacent or nearby location. Our study demonstrates that although waterfowl continued to use Paine Field geographically, they chose to utilize more desirable open water habitats (e.g., Wetland 25) rather than the shallow, densely vegetated Swanson wetland.

Habitat modifications of Swanson wetland were successful in deterring most of the waterfowl use at Swanson wetland; however, hazardous wildlife are occasionally attracted to the site. These hazards are reduced by using an integrated wildlife damage management approach, as identified in the Wildlife Hazard Management Plan for Paine Field. Harassment and removal of unusually persistent individuals are methods commonly used. Locating wetland or stormwater mitigation projects outside the separation distances sited by the FAA is a better long-term approach for maintaining aviation safety and reducing on-site wildlife hazards.

Airport Road Recycling and Transfer Station (ARTS)

The Federal Aviation Administration (FAA) currently recommends trash-transfer facilities not be sited within five statute miles of an airport (U. S. Department of Transportation 2004). Recently, there has been an increase in the number of trash-transfer facilities, a trend that will likely continue into the future. Consequently, there is a concern regarding the attractiveness of these facilities to bird species hazardous to aviation. If trash-transfer facilities serve as attractants for gulls and other birds, similar to traditional putrescible-waste landfills, the presence of these facilities near airports could increase the risk to aircraft operations (Belant et al. 1993, Belant et al. 1995, Gabrey 1997, Belant et al. 1998). Little information is available regarding the attractiveness of trash-transfer facilities to birds.

Relatively few birds and other wildlife hazardous to aviation were observed at the ARTS during this study, likely due to the fully enclosed design of the building, installation of perching deterrents and other devices, and the careful management of solid-waste handling operations at the facility. In this particular situation, the construction of the facility actually resulted in a decrease of the overall attractiveness of the site to wildlife. Our findings suggest that trash-transfer facilities might be compatible with safe aircraft operations under some circumstances, more specifically when trash-transfer facilities are well designed, operated properly, and specific wildlife deterrent procedures are adopted and implemented. Future research is needed to determine how attractive trash-transfer facilities are to wildlife species hazardous to aviation (primarily birds) and also to determine if the design characteristics of trash-transfer facilities influence their attractiveness to hazardous wildlife.

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