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AVIAN FORAGING BEHAVIORS AND HABITAT MANIPULATION AT PORTLAND INTERNATIONAL AIRPORT

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ABSTRACT

Between January 1996 and May 2001 more than 300 bird strikes occurred at Portland International Airport. Records indicate that herons and raptors consistently make up nearly one-half of species struck. These species regularly use the airport grassland as a foraging ground, feeding on ground-dwelling rodents, including the gray-tailed vole (*Microtus canicaudus*) and vagrant shrew (*Sorex vagrans*). As part of a current study, various manipulations are being made to the grassland habitat and an assessment will be conducted of their effects on the airfield rodent and avian predator populations. This study will specifically correlate the presence and behaviors of predatory birds with habitat manipulations designed to discourage resident rodent species over a 15-month period. The long-term objectives of the study are to establish standards for frequency of mowing and ideal grass height for Portland International Airport, and to determine whether adherence to these standards may preclude the need for application of poison to reduce numbers of rodents on the airfield.

Key Words: Bird strike, habitat manipulation, grass length, predator-prey interactions, mowing regime, herons, raptors, gray-tailed vole, vagrant shrew.

BACKGROUND

Extensive research has been conducted on the population dynamics of some species of ground-dwelling rodents that commonly inhabit airport grassland, as well as the reactions of these species to manipulations of various environmental factors. For example, at Toronto International Airport voles were found to constitute the primary prey of 4 resident species of raptors. While the relationship between relative numbers of the predator and prey species was unclear, it was recommended that vole populations be reduced by mowing to reduce cover and vegetation height. However, other researchers have recommended keeping grass long in order to make it more difficult for raptors to see voles.

Every airport has its own unique combination of environmental factors with which to contend in minimizing populations of birds that could be dangerous to air traffic. *Microtus canicaudus* and *Sorex vagrans* have been determined by prior surveys to be resident species at Portland International Airport (PDX). Several species of avian predators are attracted to both of these rodents. While some of the birds are transient, many appear to use the airfield as a regular foraging ground, and red tailed hawks (*Buteo jamaicensis*) and great blue herons (*Ardea herodias*) have been observed feeding on the voles throughout the grassland and at all times of day. Any birds may present a danger to incoming and departing aircraft, but herons, hawks and owls present a particular threat due to their large size and slow, low-level flight behaviors. Since January 1996 more than 300 bird strike incidents have been recorded at PDX (Fig. 1).

Of those strikes in which the bird species was identified (274, or 87%), 124 strikes (45%) involved great blue herons and raptorial predators (Fig 2). Several methods have been used to deter these birds from using the PDX airfield, including hazing with sound-blasting guns, mounting spikes on surfaces used for perching, and killing the airfield rodents with applications of zinc phosphide. PDX undertook a raptor relocation program in the fall of 1999, the focus of which has been to capture, tag and move juvenile raptors to new habitats. The frequency of raptor strikes has decreased substantially since the instigation of this program. However, several relocated birds have returned to PDX and new raptors (both juvenile and adult) continue to arrive at the airfield and attempt to stay. As

long as prey species are plentiful, none of the programs mentioned above will have a lasting effect in deterring avian predators from the airfield.

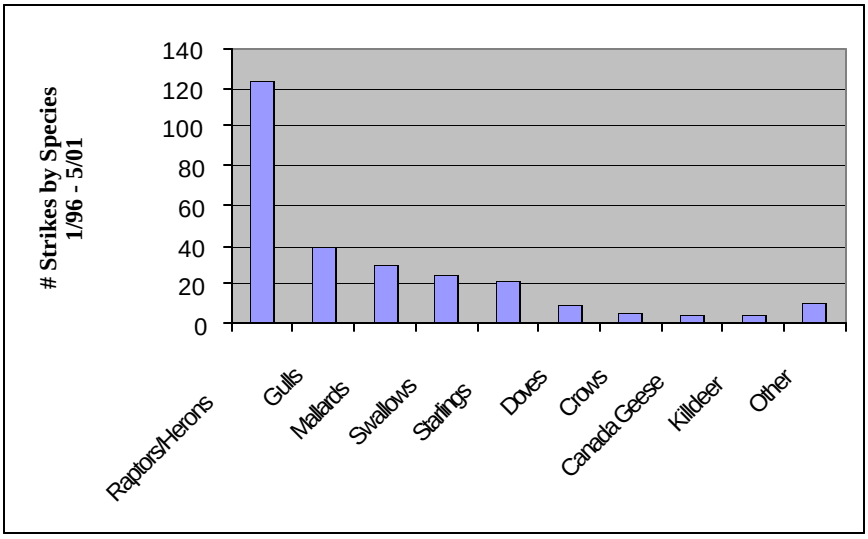

Fig. 1: Bird strike incidents reported at Portland International Airport from January 1996-May 2001 in which the species were identified

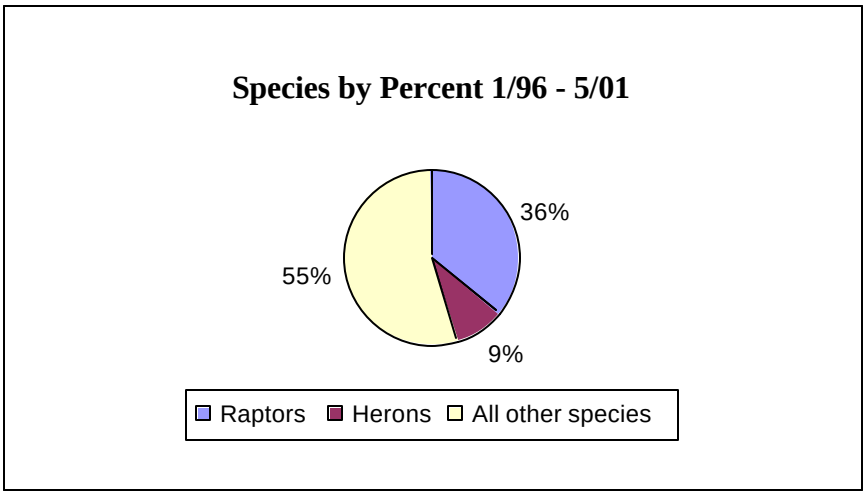

Fig. 2: Raptors and herons constitute 45% of total bird strike incidents since 1996.

As the only airport in the U.S. with a non-lethal policy toward native birds and large mammals, it is the policy of the Port of Portland to find any means possible of deterring wildlife from using the airfield rather than killing. Since 1990 a rodenticide has been applied once a year in the fall with the intention of reducing rodent populations in order to deter predatory birds. While it appears that the treatment has killed some of the airfield's rodents, the actual efficacy of this practice remains unclear, as no measurements have been made of rodent populations before or after treatment.

OBJECTIVES

The current study has been designed to measure the reactions of grassland rodents to changes in the length of airfield grass, frequency of mowing and application of zinc phosphide, and to correlate those results with the presence and behaviors of predatory birds foraging in the test plots and surrounding area.

SIGNIFICANCE

The occurrence of bird strikes is a problem of growing concern worldwide and one of the most urgent matters faced by Portland International Airport. In recent years, biologists, educators and federal wildlife managers have all played a role in addressing the immediate issue of keeping birds away from the runways. The study at PDX will provide important data describing which rodent species are living in this portion of airport property, their population sizes, how they are affected by manipulations of their habitat and how their avian predators respond to those alterations.

If it is demonstrated that these variations have a significant impact in deterring predatory birds from foraging on airport grassland, PDX and other airports with similar ecosystem considerations will have a model for using non-lethal means to reduce the danger of bird strikes.

In addition, undergraduate and graduate biology students will be provided the opportunity during the 2001-2002 school year to participate in gathering and evaluating data for inclusion in the final results and analyses. It is the intention of both PSU and the Port of Portland that in the course of this pivotal project a research partnership will be developed which fosters the expansion of learning opportunities for students at local colleges and universities.

METHODS AND PROCEDURES

Eight test plots have been established on the airfield grassland. Rodent populations in all 8 plots will be assessed by trapping over a period of 15 months. Concurrently, observations will be recorded of the presence and activity of predatory birds in and near the test plots as manipulations are made to the environment.

Study Area

Portland International Airport is on the northeast side of metropolitan Portland, Oregon (45°31'S 122°41'E). This airport currently supports an average of 900 commercial, charter, private, and military arrivals and departures per day. It is bordered by the Columbia River to the north and suburban and industrial areas to the east, south and west. In the middle of the Columbia River just north of PDX's northernmost runway lies Government Island, home to dozens of nesting great blue herons, hawks, several osprey and at least 2 pairs of nesting bald eagles. Four golf courses are located around the airport's periphery on the west, south and southeast sides. Six pairs of resident red-tail hawks are known to nest near the airfield and regularly forage there.

The observation and test area is a flat, homogeneous grassland lying between the north side of the PDX terminal building and the airport's perimeter road parallel to and just south of the Columbia River (Fig 3). The test area is edged by 120 cm of vegetation next to the perimeter road and 76 m of grassland runway safety area next to runway 10L/28R. Vegetation in the study area consists primarily of low-cut grasses, *Hieracium spp., Platago lanceolata,* and *Rumex acetosella*. The test area holds two permanent radar fixtures (RVR's). These poles are located 845m apart, stand approximately 4.5m high, and the top of each is shaped roughly like a "T", making them prime raptor perches.

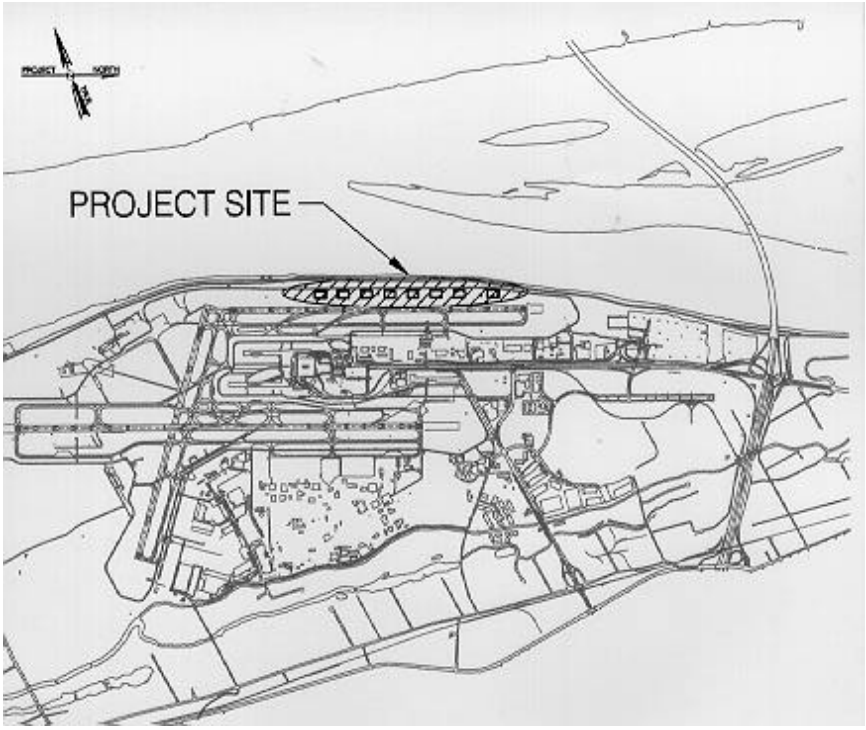

Fig 3: The study area is located on the north side of PDX, between the north runway and the Columbia River.

Test plots and variables

The variables examined in this study will include grass length, frequency of mowing and the use of rodenticide (Table 1) PDX's standard mowing regime is to begin on one side of the airfield and mow until the opposite side of the airfield is reached. The grass is cut to an average height of 13 cm. The airfield personnel take approximately 3 weeks to mow the entire property with the first mowing of the year starting in April. Since this 3-week interval is standard, it will be used as the interval of mowing in control plots. Tests will also be done with mowing intervals of 10 days and heights of 8 cm (short interval, short grass) vs. no mowing at all (long interval, long grass). Grass will be cut on the control plots to 13 cm at each mowing. To test the effectiveness of rodenticide, two test plots will be maintained as if control plots, with grass cut every 3 weeks to 13 cm. These 2 plots will receive a single application of "ZP Rodent Bait" (active ingredient zinc phosphide) partway through the experimental cycle. Airfield personnel will spread the zinc phosphide-treated bait with a mechanical spreader mounted on the back of a tractor.

Type of Plot	Grass Length	Interval
Control (standard)	13 cm	3 weeks
Long, Long	Not yet known	No mowing
Short, Short	8 cm	10 days
Standard with zinc phosphide application	13 cm	3 weeks

Table 1: Summary of the plot distribution and assignment of experimental variables to be used in PDX habitat manipulation study

Trapping

The eight experimental plots have been laid out by Port of Portland survey staff in a row along an east-west transect at the north side of PDX property and parallel to the Columbia River. Each 60 x 90 m plot will contain a 5 x 8 array of 40 trapping stations, 35 of which will house a 3" x 3.5" x 9" .020 aluminum folding Sherman live trap

insulated with cotton batting. Because *S. vagrans* are rarely caught in Sherman live traps, the five remaining trapping locations in each array will be selected randomly for placement of an in-ground pitfall trap. There will be 10 m between each trap and each plot will be edged by a 10 m buffer zone. Plots will be placed 100 m apart, and randomized so that no two of the same type will lie next to each other. Traps will be baited with rabbit food in pellet form.

Trapping will be conducted at 6-week intervals over 15 consecutive months beginning in July 2001. Three trapping sessions will occur before instigation of the various mowing regimes in order to establish baseline data. Traps will be placed and baited with doors secured open for 48 hours prior to actual trapping on each plot in order to accustom animals to their presence. Under varying weather conditions, traps will be anchored and/or shaded as needed with pieces of wood. Mean height of grass at trapping will be determined from 5 random grass height measurements in each plot. Data collected for each animal will include species, weight, size, sex, approximate age and reproductive condition. Live animals will be marked with ear tags or shaved areas then released back into the same plot.

Bird observations

Weekly observations will be conducted and records kept of avian behaviors in and near the test plots.

Additional factors

Bird strikes
The wildlife specialist at PDX maintains official records of all bird strikes. Special attention will be given to strike incidents involving predatory birds during the experimental period.

Hazing events
While the PDX airfield crew is supportive of this research study and prepared to cooperate in any way possible, their first consideration must be for the safety of airline passengers. Therefore, although the airfield staff will do their utmost to be sensitive to the parameters of the experiment, they will conduct hazing efforts as they deem necessary.

SUPPORT

This project has strong support from the Port of Portland. There were 38 bird strikes at PDX in the first five months of 2001, and the airport is anxious to play an active part in this project. The airport's own survey staff have laid out and surveyed the test plots, and maintenance crews are assisting in the provision of supplies, equipment, mowing and baiting. In addition, biological and habitat management consultants from Pacific Habitat Services Inc. (PHS) have been working for the past year to conduct a Biological Assessment for the airport. PHS staff have generously offered to collaborate in this project, particularly in the identification and observation of the red-tailed hawks that are residents in various parts of the airfield and surrounding property. The PHS staff have mapped raptor nesting sights and begun a program of marking resident individuals, as well as surveying a heron rookery on Government Island. Their data will be important as supporting information when results of this experiment are compiled.

The Port of Portland has a standing contract with Mt. Hood Community College (MHCC) for student interns to perform work and do research projects at the airport. MHCC interns will assist with bird observations, trapping and data collection as long as funding is available. Portland State University Biology students will also be given the opportunity to participate in observation and data collection as an introduction to field techniques. Members of PSU's Biology faculty are providing expertise and advising, and the department is furnishing laboratory supplies and facilities.

ACKNOWLEDGMENT

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