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AN AVIAN/AIRPORT STUDY FOR STANDIFORD AIRPORT, LOUISVILLE, KENTUCKY RESULTS AND MANAGEMENT IMPLICATIONS

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Abstract: An avian/airport study was conducted by the U. S. Department of Agriculture, Animal and Plant Health h Service, Animal Damage Control (ADC) from 9 February 1989-18 March 1990 to evaluate near-tern bird control Standiford Field Airport (SDF), Louisville, Kentucky. Field surveys were performed on SDF and the Outer Loop Landf to gather data on both daily and seasonal trends in bird activity and effectiveness of management efforts employed by operator to control bird activity. Data for high-interest species groups were sorted according to site, time of day, wea month. Raptors were present at the airport and landfill throughout the year. Mourning dove *(Zenaida macroura)* number at the airport and landfill during the summer months. American crow (Corvus *brachyrhynchos)* numbers peaked at b during winter. Spring, summer, and fall crow numbers were consistently low. Blackbird (Icteridae) numbers varied di year, with larger numbers present at both sites during fall and winter. Data on bird occurrence at the airport and landfill to time of day showed few if any obvious trends. This study resulted in recommendations relative to expanding SDF. O. concern was the OLL, the major landfill for a 6-county area, which is located approximately 1.6 km south of the current It was concluded by the Federal Aviation Administration (FAA), based on the ADC study, that the hazard potential for, activities at SDF can be adequately minimized (low levels of bird activity can be effectively achieved by recognized techniques). To ensure that the compatibility of the airport and the nearby landfill will be maintained, a Wildlife Mans Task Force was formed and a *Strategic Plan for Wildlife Hazard Management for Standiford Airport* was implemento

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Airports worldwide experience problems with wildlife, and birds in particular. Birds are a serious and persistent threat to air traffic. Airports, with their large expanses of paved and open vegetative areas, attract large numbers of flocking birds such as gulls *(Garus* spp.), crows *(Corvus* spp.), blackbirds, and European starlings (Sturnus *vutgaris)*. Additionally, raptors (which are hazardous to aircraft because of their large size) use the open habitat for hunting, loafing, and soaring. The location of a landfill in close proximity to an airport can compound existing bird activity, because landfills represent a significant food source for omnivorous birds.

Aviators have long recognized that birds or flocks of birds at or near airports represent a threat to air traffic. Between 1,200 and 1,500 bird strikes are reported annually to the Federal Aviation Administration (FAA) (DeHaven 1985). The direct cost of these bird strikes in the United States is estimated at $2535 million. Additional expenses, estimated at $5 million, can be added as indirect costs (i.e., rescheduling of passengers, equipment change or repair) (DeHaven 1985).

The Regional Airport Authority of Louisville and Jefferson County (RAA) has undertaken a Louisville Airport Improvement Program (LAID) for Standiford Field Airport (SDF), Louisville, Kentucky that has been approved by the FAA. The LAID calls for the elimination of 1 runway (3,048 m) and construction of 2 parallel runways (3,048 m each). The net addition will increase the extent of paved and open vegetative areas attractive to birds. Additionally, S DF is located just north of the principal landfill for Louisville and Jefferson

The new runways will violate the "proximity" criterion s for landfills in FAA Order 5200.5A (U. S. Dep. Transp. This criterion prohibits the location of any runway i planned to be used by turbojet aircraft within 3,048 1 landfill. However, a runway may be located within 3,0, an existing landfill operation, if the landfill cannot be within a reasonable time, and acceptable methods i control are maintained.

This study was conducted to determine: (1) the e) bird activity at SDF and its environments; (2) if dar situations are created by the presence of these birds; an control procedures (e.g., harassment, habitat modified population control) to mitigate bird activity are necessary SDF environment was defined as those areas within 3,0~ the airport. The Outer Loop Landfill (OLL), which is and operated by Waste Management Inc., will lie well the airport environment when the LAIP is completed.

We wish to thank the RAA of Louisville and Je County forproviding access to airport property and fund this project. Our appreciation is also given to Waste M ment Inc., Outer Loop Recycling and Disposal Facility f cooperation and unlimited access to the landfill.

METHODS

The occurrence of birds on SDF and its environme documented by field surveys. Five trained observers cor

surveys 2 days per week at the landfill and 1 day every 2 weeks at the airport. To determine daily activity patterns, 4 counts were completed each day: (1) morning (30 minutes after sunrise); (2) late-morning (between 0930 and 1100); (3) midafternoon (between 1330 and 1500); and (4) evening (2 hrs before sunset). As day length varied, starting times were adjusted to allow for even distribution of counts during the daylight hours.

Field counts were designed to detect all bird activity in the vicinity of both the landfill and the airport. Six observation points were located around the OLL allowing complete coverage of the area in approximately 1.75 hours. In a similar manner, 4 observation points were located at the airport, allowing a comprehensive survey to be accomplished in approximately 1.25 hours. Data were recorded for 15 minutes at each observation point, with 15 minutes of travel allotted between points. All birds seen or heard were recorded with estimates of number in flock, location, and activity. Data were recorded using a standardized set of abbreviations for habitat type and location. Additional surveys of the landfill were implemented in March 1988, to increase accuracy of estimates. Also, because bird activity was found in the adjacent railroad yard, a seventh observation point was added to the OLL work area.

Data for high-interest species groups were sorted according to site, time of day, weather, and month. Groups of similar species were pooled for analysis by the following: (1) raptors/ hawks (Accipitridae), falcons (Falconidae) and owls (Tytonidae and Strigidae)); (2) mourning doves and rock doves *(Columba livia);* (3) European starlings, red-winged blackbirds *(Agelaius phoeniceus),* rusty blackbirds *(Euphagus carolinus),* common grackles *(Quiscalus quiscula),* and brown-headed cowbirds *(Molothrus ater);* and (4) American crows.

RESULTS AND DISCUSSION

Bird population data were collected from the SDF, the OLL and their environments from 9 February 1989 through 18 March 1990. During the 13-month study, 80% of the surveys possible were conducted (338 counts at OLL, and 79 at SDF). Monthly population trends were apparent for some speciesgroups (Tables 1 and 2). '

Shorebirds, herons (Ardeidae), and waterfowl (Anatidae) were observed in ditches and seasonally flooded habitat on and around the OLL and SDF. These wetland areas are not perennial and do not attract large numbers. Additionally, with the implementation of the LAID, these seasonal aquatic habitats will no longer exist.

Raptors are attracted to the open, grassy areas of both the OLL and SDF, which provide small mammal populations and thermal drafts. Raptors were present at both sites in low but relatively consistent numbers throughout the year (Tables 1 and 2). The red-tailed hawk *(Buteo jamaicensis)* and American kestrel *(Falco sparverius)* were the most noted "hawk" species, with the short-eared *owl (Asio ffammeus)* (an uncommon winter resident) accounting for most owl observations. Raptors were especially dangerous to air traffic because of their large size and flying habits; 2 short-eared owls were found dead near runways. Although causes of death were unknown, both birds appeared to have been struck by aircraft.

The number of doves utilizing the OLL and SDF peaked during June and July (Tables 1 and 2). The summer peak represents observations of mourning doves after the early reproductive period. Mourning doves were attracted to areas with sparse vegetation and open ground at both the airport and landfill. On the OLL, a secondary peak of 90 birds per survey was observed in December (Table 1). This secondary peak represents observations of rock doves attracted to spilled grain in the railyard adjacent to the OLL. Rock doves observed on the SDF site utilized runways and taxiways for picking grit and loafing, while roosting and nesting occurred on one of the terminals.

American crow numbers peaked at both the landfill and airport during the winter months (Tables 1 and 2) when a traditional winter roost adjacent to the airport became active. Crows, when present, continuously crossed airport approach paths on their way to and from the OLL and other feeding areas. Additionally, crows utilized the runway-clear-zones on several occasions as a staging area before moving to the roost. During spring, summer, and fall crows were encountered in low numbers at both sites. Crow management is important because of their large size and fidelity to the airport.

Blackbird numbers varied during the year on the OLL, and were most abundant during fall and winter, with lower numbers in spring and summer (Table 1). Summer counts of blackbirds at the landfill included flocks of juvenile European starlings, while fall and winter totals included many common grackles, red-winged blackbirds, brown-headed cowbirds, and rusty blackbirds. Totals for blackbirds at the airport varied, showing no apparent trends (Table 2). The European starling was the most abundant blackbird species observed at the airport.

Interestingly, data on bird occurrence for the OLL and SDF (Tables 3 and 4) showed very few obvious trends relative to time of day. Hawks consistently appeared in low numbers throughout the day, while owl activity occurred during late afternoon or early morning. Peak numbers of doves were observed before midday at the landfill. No such trend was found for airport observations. Crow numbers were higher in the afternoon at both sites, as a result of staging before moving on to roost. Blackbird numbers were comparable throughout the day at the landfill. The only obvious trend at the airport was that more blackbirds were observed after midday.

An attempt was made to interpret observational data and verify habitat use on the OLL and SDF. The focal point of bird activity at the OLL was the active fill site. In general, the colder the temperature, the more the site was utilized for feeding. Also, it was not unusual for the active fill site to be covered with

Table 1. Average number of birds observed/survey by month at the Outer Loop Landfill during February 1989 through 1990, Louisville, Kentucky.

Month	F	M		A	M	J	J	A	S	O	N	D	J
Hawks	5	4	2	2	3	8	9	5	3	5	9	7	
Owls	+'				+					+	+		
Doves	17	8	5	8	186	179	24	15	20	9	9035		
Crows	120	16	2	3	4	3	3	3	32	657	376158'		
Blackbirds	255	313	52	141	540	357	548	353	477	1207	695683		
No. surveys	36	45	26	25	22	23	25	20	33	29	3629		

Table 2. Average number of birds observed/survey by month at Standiford Field during February 1989 through March 1 Louisville, Kentucky.

Month	F		M	A	M	1	J	A	S	O	N	D	J
Hawks	3	3		1	+'	1	3	2	2	3	3	2	3
Doves	2	7		5	6	12	26	19	19	24	6	2	12
Crows	3	3		+	0	+	2	0	1	2	86308		16
Blackbirds	157		401	207	55	105	118	97	92	277	16836		40
No. surveys	11	9		5	6	5	8	5	6	5	6	7	6

Table 3. Average number of birds observed/survey by time of day at Outer Loop Landfill during February 1989 through March 1990, Louisville, Kentucky.

Period	Morning	Late-	Mid-	Morning	Afternoon	Evening
Hawks	5			5	7	3
Owls	0			0	+'	+
Doves	47	65		43	19	
Crows	96	91		145	119	
Blackbirds		478		448	494444	
No. surveys		78		91	7594	

Table 4. Average number of birds observed/survey by time day at Standiford Field during February 1989 through 1990, Louisville, Kentucky.

Period	Late- Morning	Mid Afternoon	*Evening*
Hawks	2	332	
Owls	0	00+'	
Doves	13	9179	
Crows	3	6+120	
Blackbirds	117	115228	225
No. surveys	26		

birds on Sunday mornings when the landfill was closed. At SDF, no trend in bird activity was apparent which would indicate relative habitat preference. The margins of weed and grass fields offered prime foraging habitat for several songbirds, but appeared to offer few feeding opportunities for nuisance species. Forested tracts and field margins provided habitat for songbirds. Blackbirds and crows were also observed staging in the forested tracts prior to mass movement.

In general, habitats on the OIL and SDF were attractive to birds for their openness, food availability, and lack of disturbance. With human access controlled to both sites, birds may rest and feed with little fear of human disturbance.

MANAGEMENT IMPLICATIONS

Four bird goups were present at SDF in sufficient number, to require management: (1) blackbirds; (2) crows; (3) doves and (4) raptors. It was assumed that the observed number, represent typical bird activity in and around the airport.

Blackbird species and starlings were present at the OLl and SDF year-round and will require management throughou the year in these locations. Crows will have to be carefulh monitored and managed during late fall and winter, unless the patterns of crow activity during posthatching or premigration periods change. Crows must be managed because their sip

makes them particularly hazardous to aircraft. Doves must be managed during the summer months, when postbreeding populations can pose a safety hazard. Close observations should be made the remainder of the year. Raptor populations should also be continually monitored and managed.

Recommendations

Harassment.-Assigned personnel should be trained to monitor bird activity in areas immediately surrounding the airport and harass birds in these areas by using audio and visual scare tactics. Organizing and deploying this type of patrol to drive birds from the airport is probably the best active control method for regulating daily bird activity.

The patrol should consist of 1 or 2 dedicated personnel who can harass birds as problems arise. These workers should be either full-time bird chasers, or current employees whose job description allows them to confront safety problems at a moment's notice throughout the day.

Bird patrols should be intensified during periods when birds are more numerous (i.e., during winter months, especially during snow cover). Birds should not be harassed when aircraft are approaching or departing the airport. Lethal harassment techniques (i.e., Avitrol and live ammunition) could be used to enhance the effectiveness of the program. The use of sirens, noise-making pyrotechnics, and amplified distress calls of problem birds have proven effective at dispersing birds from airports.

The effectiveness of any active bird-control program is greatly enhanced by the proper and timely deployment of ground patrols. Considering this fact, FAA tower personnel should be made an integral part of a hazing/shooting program. They can identify problem sites and provide valuable information about bird activity at the airport. Tower personnel should have direct communication with ground crews to inform them of potential problems, **and to report any** bird/aircraft collisions. By cooperating in this manner, problems could be acted upon immediately, and dead birds could be collected and frozen for later identification.

Another advantage of joining both crews into a working team is the development of bird-hazard data which could be used to fine-tune and validate control techniques currently in use. Data that should be collected are the location, number, and species of birds using or flying over the airport or involved in airstrikes, and the time that these birds present problems.

Habitat manipulation: Habitat manipulation can be used as a more permanent and long-term deterrent to birds using the airport. Many manipulation techniques have been used successfully, but results are varied. Therefore, we suggest that they be tried in small areas (hot spots) on an experimental basis. Generally, grass length should be maintained between 20 and 30 cm to discourage feeding and loafing by problem birds. However, if grass is allowed to grow too tall, rodents and subsequently, predatory birds and mammals may increase in number. Thus, excessively tall or short vegetation can create a hazardous situation. Additionally, low wet areas and zones of open standing water (i.e., those found after heavy rain), provide feeding, drinking and bathing areas for many species. Wet areas should be eliminated by grading, filling, resurfacing, covering, or draining. Many of the birds using the airfield's grassy areas are insectivorous. With this in mind, broadspectrum insecticides may be applied to grassy areas having heavy bird usage. To discourage dove usage of runways and taxi lanes, paved surfaces should be periodically swept clean to prevent an accumulation of grit and gravel.

Lethal baiting.-It may be necessary to decrease the blackbird/starling, rock dove, and crow populations at the landfill and airport by controlled-baiting with the avicide, DRC-1339. This type of control when combined with harassment, could effectively keep nuisance bird populations low except during fledging periods and migration (when the numbers would be somewhat higher, but still within tolerable levels).

Bird roost location: The location of all major blackbird and crow roosts within 8 km of the airport should be documented as soon as possible. These sites should be ground-truthed for numbers and classified as either traditional or transitional and premigratory or migratory roosts. Bird movements to and from these roosts should be monitored and if bird activities infringe upon aircraft safety, the roosts should be either moved or destroyed.

Thickets providing roosting habitat on or near the airport should be thinned or eliminated. Birds find these dense stands of vegetation highly attractive and continue to use them as long as they exist.

If birds are using buildings or other permanent structures for roosting, exclusion, harassment, and lethal control should be used to move the roost away from the airport area.

Dump Operation: An operational landfill provides a readily available food source that may directly feed hundreds of birds, especially crows, gulls, starlings, and blackbirds. Operation of dumps containing putrescible wastes near jet-use runways is incompatible with airport safety. Closure or relocation of the dump is the most obvious solution to dump-related bird problems. However, this is often not the most feasible solution. The immediate covering of garbage with fill material, coupled with lethal and nonlethal bird control tactics, will reduce bird usage of the dump. Allowing grass to grow 20 to 30 cm tall on unused portions of the dump should discourage birds even further. Officials from appropriate county, state, and federal agencies could coordinate a draftplan aimed at reducing bird usage of dumps near airports.

Permits.-All necessary permits must be secured for the removal of problem species from the airport. These permits should be renewed upon expiration.

FAA warnings.-Warnings about existing bird concentrations should be immediately relayed to incoming and departing aircraft by tower personnel. FAA's Automatic Terminal Information Service could be incorporated to accomplish this goal.

These recommendations have been made to provide guidance in alleviating problems with birds at SDF, but may be generally applied to any airport with similar types of bird problems. ADC personnel are available to implement any of these control methods.

As a result of this research, it was concluded by the FAA, based on the ADC study, that the hazard potential for aviation activities at SDF can be adequately minimized (i.e., low levels of bird activity can be effectively achieved using recognized control techniques). A by-product of this study was the formation of the Wildlife Management Task Force and the Strategic Plan for *Wildlife* Hazard *Management for Standiford* Airport. The task force is comprised of the state wildlife agency, the local health department, the local animal protection agency, the OLL and the RAA. An ADC wildlife biologist monitors wildlife activity in SDF's environment and takes action to mitigate any hazards posed by wildlife. The biologist ad the task force of any significant problems and requests ass' from members within their area of responsibility. The s plan outlines the necessary work to ensure that airport safe maintained. Personnel at SDF have been trained in identification, and conduct 3 surveys at SDF per week. surveys are given to an ADC biologist who analyzes information. These data are used to detect trends in wil activity. If dangerous situations arise, SDF and OLL are trained to respond by using pyrotechnics and distres tapes to get immediate relief. They then report these sit to the ADC biologist who assesses the problem, plans mid tion activities, and executes management strategies to rem any wildlife problems at SDF and its environment. The force and management plan are designed to ensure that compatibility of the airport and nearby landfill will be tained.

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