



**Keep'em Flying-  
Planes and Birds**

**BASH**

Carl Lahser



watch for birds? Pilots might not have time to read signs and drive airplanes fast at the same time. The signs would be an airfield obstruction and something else for the birds to perch on.

h. program a drainage improvement project? This would be the long-term solution.

Now we have changed our paradigm. We walked through a hypothetical BASH situation and arrived at some reasonable workable solutions. Someday I hope this will be the norm rather than the exception on every base.

Until then, keep'em flying.

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into your engine?

3. Remove the food source by:
  - a. herbiciding the airfield? Herbicide kills herbs or plants not grasshoppers.
  - b. herbiciding the fenceline? Herbicide does not work well on mature grass. The grass is ready to die anyway, and, besides, herbicide would not eliminate the seeds.
  - c. forget the fenceline and concentrate on eliminating grasshoppers on the airfield? Very good! You're getting warm.
  - d. buy more propane cannons? Where did this come from? Cannons are not the solution to all your bird problems.
  - e. spray the areas with a contact insecticide to kill the grasshoppers? This could result in secondary poisoning and adverse publicity not to mention possible legal problems.
  - f. use herbicides to eliminate the grass and grasshoppers?  
Herbicides would kill the grass and could denude the area causing dust and FOD and attracting some bird species to the bare spots. Grasshoppers will eat the dead grass, wallpaper, and clothing when they are hungry.
  - g. erect a sign telling the pilots to

treatment to control the birds:

a. shoot all the birds along the flight line? See the same question above. Same reason applies.

b. eliminate the Johnsongrass. Probably a good idea, but if the birds were in the fenceline we wouldn't have a problem so long as you keep your airplane on the runway.

c. eliminate the grasshoppers. Now we're getting somewhere!

d. buy more propane cannons. They don't work on grasshoppers and would be marginal for this specific problem.

2. Shooting the birds will:

a. teach them durn birds to stay off the airfield? Neither the live or dead ones learned much.

b. create a vacuum that will be filled by other birds through recruitment? Definitely. The new birds won't know anything at all about avoiding the runway.

c. possibly kill a threatened or endangered species? Big fines and crossbar hotel time.

d. scatter shot (FOD) on the runways? Anyone for tossing little steel ball bearings

## THE BLACK BIRDS STRIKE A BASH PLAY IN THREE ACTS

By

Carl Lahser and Julie Jussila

The airfield is a dangerous place at best. Aircraft. Birds. Fuel. Munitions. People. Personalities. Mix them in any combination.

Over the past five years, the Bird/Wildlife Aircraft Strike Hazard (BASH) program has made a lot of progress. The number of bird strikes in AETC has risen from 594 in 1995 to 913 in 1998. However, these figures don't tell the whole story. Repair costs have not risen as steeply as the strikes. During this period, we began flying lower flight levels where there are more birds. AETC's reporting and record keeping of bird strikes has improved. Most importantly, we have been getting our collective BASH act together.

This last item, getting our act together, has been an interesting process of people management. All of the following situations were observed during the past five years. The incidents were scattered over a dozen flying bases in three MAJCOMs.

Let's look at a composite BASH situation at good old Hypothetical AFB. Presented as a three-act play this scenario might serve as both flashing warning lights of things going wrong and as a road map for improving future operations. Let's hope this play is a comedy of errors and not a tragedy.

The curtain rises as a flight of black birds descends on one end of a duty runway. The airfield goes to Bird Strike Condition Severe closing the base to flying. How did we get to this point? Read the program. Let's identify the cast of characters in order of appearance.

**The storm.** Ten days before the birds arrived the base was hit with a two-day storm that dropped eight inches of rain. The grass grew, but the tractor could not get out to mow the wet airfield. Mosquitoes and other flying teeth multiplied which attracted swallows by day and night hawks by night. Seed heads began to appear on the grass and on the sor-

the base's GIS data layer on vegetative cover on your laptop computer, you find Johnson-grass occurs in the fenceline a quarter mile away. Knowing the feeding behavior of this bird, you decide grass seed is not a determining factor.

Next, your expert gets out a special insect net and takes a short walk through the area. The walk and sweep net survey confirms the presence of a large number of grasshoppers on the airfield. They occur only in a swale that has better soil and greener grass than the surrounding areas on the airfield. Periodic sweep net surveys, use of pheromone sticky traps or light traps and consulting other forecasting tools on base or in the local area will help predict population peaks. This information is used to determine if an action population count for insecticide application exists. Coupled with direct observations this information may indicate the need for other actions such as a drainage correction project or fence repair to eliminate deer on the airfield.

Let's try another multiple guess test.

1. What would be the most effective

tion? OK as part of a short-term solution. If cannons are in your BASH toolbox, use them.

2. Get out the shotguns and shoot everything in sight? This might work if you intend to move out on the airfield for the duration. The birds were there for a reason and will return as long as the reason exists. Besides, you might shoot an endangered species and wind up sharing a cell and a big fine with the wing commander. Bad idea.

3. Cover the grit with topsoil or sand? How long would this cover stay in place with aircraft operations?

4. Get the vacuum truck to pick up the gravel? Might work but not really practical.

5. Spray the gravel area with oil emulsion? This is what our airfield engineer recommends. The oil makes the gravel stick together and makes the gravel taste bad. This has minimal impact on the grass but would eliminate a reason for the birds to be present on the edge of the runway.

Now we visit the second site where the crop analysis of birds 2 and 3 showed 10% Johnsongrass seed and 90% grasshoppers. Knowing the airfield intimately or consulting

ghum fields adjacent to the base attracting other generic seed-eating black birds.

**Birds.** These are generic black birds such as swallows and grackles.

**Air Field Management.** The airfield manager defined his contract to include periodic airfield inspections but did not include bird dispersal. His lawyer said the liability ended when the inspections were completed, and recommendations for bird strike conditions for the airfield were made.

**Flight Safety.** The aerospace engineer pilot Captain, just assigned to flight safety was a recent safety school graduate. The base 91-212 Plan, Bird Aircraft Strike Hazard (BASH) Plan, was out of date. The Bird Hazard Working Group was non-functional. The bird dispersal team was not clearly defined.

**The fire department and security police.** Although both organizations are available, the fire department is not a normal part of the bird dispersal team. Security police and pest management may be involved in situations requiring shooting and trapping pests.

**The Natural Resources Manager.** Although this person was not a degreed biologist and wore several hats that allowed only

15% time for the natural resources program, this was the best resource on base for the BASH program. Remember that BASH is NOT a CE program.

**Grounds management contractor.**

The company had one small farm tractor with conventional tires and a rotary mower. This equipment was used to mow several areas on base including the main gate and access road, the airfield, and the auxiliary flying field 30 miles away. Conventional tires do not work well on the wet airfield and a standard rotary mower will not cut the grass if it get too tall.

**Pest Management.** Surveys of airfield insect populations and controlling insects and other pests on the airfield were not specifically identified in the statement of work. Neither was testing or maintaining the propane canons. The contractor's lawyer recommended avoiding liability by doing nothing on the airfield. Also, bird dispersal equipment and an ultra-low volume (ULV) mosquito fogger was not identified in either contractor or government supplied equipment.

**Contracting.** Airfield management and civil engineer operations had been contracted. Since the base had no significant

there and what can be done to prevent the possibility of their bird brothers and sisters form being ingested into engines.

Lets have a little multiple guess quiz on possible solutions.

1. Brief the pilots to land and takeoff short to avoid these areas? Don't think this will work.
2. Look at the areas where the birds were found and try to determine what attracts birds there?

What a novel idea! Let's try it. Driving up to the 3000-foot marker of RW06L you notice several doves and a couple meadow-larks on the edge of the runway and in the grass along the runway edge. The airfield here looks like the rest of the airfield but there has been some work on the runway margin and you find some small gravel that had been swept off the runway. These rock particles are the same size and shape as the grit in the crop.

What next?

1. Move some cannons to this loca-

RW23R. All the birds appeared to be Eastern Meadowlarks. Networking with another base 200 miles northeast had forecast the arrival of this species to within a few days. The necropsy showed BIRD 1 had no food in its crop, but its crop did contain fresh gravel. Crop analysis of BIRDS 2 and 3 showed crop contents to be 10% Johnsongrass seed and 90% grasshoppers. The county agent's insect trend analysis indicated an increase in the grasshopper population in the local area.

Necropsy? Crop analysis? Insect population forecasts? Necropsy is the examination of the dead birds. The crop is the bulge in the esophagus that contains gravel or "grit". The grit helps break up seeds and other food so it can be digested much more easily. Food is slowly passed through this muscular organ on its way to the stomach. Analysis of crop contents can indicate what has been recently eaten and where the grit and food came from.

The county issues periodic insect population trends and forecasts based on various types of trapping, historical data and local weather forecasts.

Now you can visit the sites where the birds were found to determine why they were

bird dispersal actions in several years, there was no perceived requirement to participate in bird control and dispersal or obtain equipment specifically included in the bid package.

**Legal.** When these needs for the BASH program were identified the contractor's lawyer recommended the contractors not do anything on the airfield due to possible liability if an aircraft accident were to occur. The liability issue was clarified. If there was no wrong doing there was no more liability on the airfield than elsewhere on base.

**Supply.** As for the ULV, a unit was ordered with expected delivery from depot in 18 months. Bird dispersal equipment, such as bangers and screamers, was ordered with no proposed delivery date.

Now that the cast is assembled and the curtain has risen, let's look at Act One.

The light comes up and the birds are on stage.

Enter stage right. Scene One. Two planes are in the pattern. As they land, each plane hits three birds, and another 30 birds killed due to air turbulence. The airfield was closed, and local flying was diverted to the auxiliary airfield for the duration. Exit stage left.

Now we know it's not a tragedy, but it still may not be funny.

Scene Two. Enter stage right. The airfield manager alerts flight safety who fires the propane cannons with no appreciable effect. Next, Flight Safety alerts the crash trucks to try to spook the birds but sirens, flashing lights, and even water spray have no effect. Security police were called, but shotguns were found to be ineffective. The natural resources manager was contacted and visited the site. The birds are tentatively identified. Recommendations are made to fog the airfield to remove the insects and mow the grass to remove the seed heads. All exit stage left.

Scene Three. Enter stage left. The grounds contractor who was mowing the driest areas on the airfield has been called off to mow the area around the main gate. (Remember there is just one tractor available.) When the birds arrive the tractor returns quickly to mow the airfield and quickly gets stuck. The birds don't care.

Enter stage right. Pest management is told to spray the airfield. They fire up an all-terrain vehicle with a boom sprayer and set to work. The birds laugh.

with tongs and put in zip-lock plastic bags. Tongs are used to keep the mites and other critters on the birds from getting on the people. The plastic bag is to keep the critters from infesting the truck.

Returning to ops the manager calls the bird control officer and turns the bird over for study. The bird control officer (could be the natural resources manager) looks at the log, makes a tentative identification of the birds, performs a necropsy and prescribes corrective measures. He or the flight safety officer fills out a bird strike report (AF Form 853) and sends the form along with feathers, feet, beak and other non-putrescible bird parts to Dr. Carla Dove for confirmation. Just like going to the doctor for a cold.

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What information is relevant? What is the decision making process? The log said BIRD 1 was found as a fresh kill at the 3000-foot marker of RW06L and BIRDS 2 and 3 were found at the 6000-foot marker on

Another factor is elimination of bird and bat habitat in and around airfield structures. Design of these facilities should consider eliminating ledges, overhangs and any penetrations, and other potential roosting and nesting sites that might be attractive to birds and bats. Pre-design planning will make maintenance easier as well as reduce potential BASH problems.

The proceeding has covered many of the principles of bird control and changes in philosophy. BASH is a safety program to protect human life and reduce property damage. This is accomplished by applying integrated pest management techniques. It will not succeed without good planning and timely implementation.

Let's look at bird and wildlife control as a process. This process includes using many common techniques of wildlife management, habitat or behavior modification, plus a few that are not so common. All of these services may not be available or even needed on every base.

About ten o'clock one fall morning on Hypothetical AFB, the airfield manager drives the active runway and finds several dead birds. These are noted in a log, picked up

Enter stage right immediately behind the pest managers. Someone remembers the golf course has a couple tractors with floatation tires and mowers. These tractors are requisitioned and enter the fray. They mow the freshly sprayed grass thereby wasting the pesticide. The tractors don't get stuck but the grass is too tall and gets pushed over instead of being cut. No sickle bar mower is available to cut the tall grass.

Enter stage right. The stage is getting crowded as a falconer arrives under a panic driven service contract and releases his bird. The falcon has minimal impact for two reasons. The falcon usually requires time to establish its territory and the invading birds were not the normal prey of this type of hawk. The birds exhaust their food supply and leave in all directions. Everyone else exits and the lights fall.

During the intermission see if you can figure out what is going to happen. Do they (birds and planes) ever fly again? Does the tractor get out of the mud? Does Zelda get married? (Oops. Wrong play.) The suspense is maddening.

Act Two. Scene One. The curtain rises on the entire cast except the birds sitting

around a conference table. As they discuss what happened, they become acquainted and arrive at a cooperative plan. The BASH Plan and Wildlife Management Plan are updated. A Bird Hazard Working Group is organized chaired by the Vice-Commander. The bird dispersal team members are identified along with their available resources. Contracting amends the various contracts to require appropriate services and equipment to maintain the base and auxiliary airfield. Supply gets items delivered in a timely manner.

In Scene Two, Flight Safety, pest management and the natural resources manager begin regular bird, plant and insect surveys and necropsys. A bird control consultant is hired part time to manage bird populations and reduce other bird problems on base.

In Act Three, a contingency plan is made to meet next fall's migratory invasion. Zelda gets engaged. The fat lady sings. Curtain drops. Everyone takes a bow. Keep'em flying.

END END END

and overrun or within five miles of the centerline of the approach-departure clear zones. Harvesting or plowing of fields near the airfield should be coordinated with flight operations when possible. The BASH potential of airfield property outleased for crop production should be considered during the outlease process. Control tower personnel, radar operators and pilots must remain alert to bird activities and make use of the Bird Forecast publication and real-time warnings. Seasonal or diurnal patterns such as migration flights and flights between rookery and feeding areas are predictable and flight schedules may have to be adjusted.

Bird control specialists have a number of devices in their tool kit to control or modify bird activity. These tools include gas cannons, shellcrackers, bangers and screamers, recordings of the distress cry of various birds, and similar electronic and mechanical devices. These offer temporary local control but can result in only moving the birds from one area to another if not done properly. Normal pest control and ground maintenance practices that modify bird and rodent activity should be used in combination with the scare devices.

can become foreign objects (FOD) that can damage aircraft engines. Keeping the area around the lights clean also provides a breeding area for ground nesting birds such as the Killdeer, which, in turn, may become a BASH problem.

Maintaining the grass on the airfield at 7-14 inches discourages raptors by preventing them from seeing or attacking rodents in the tall grass. It also reduces thermals that permit soaring. It is also a suitable height to prevent intergroup communication of bird and rodent populations and interrupts their surveillance for predators. It also reduces interspecies relationships between predator (hawk) and prey (mouse). These factors discourage some species from living in tall grass. To this end, some grasses like Bermudagrass and Buffalograss grow naturally within this height range. These grasses should be considered for use in an integrated environmental management program.

Bird feeding and loafing areas such as grain fields, ponds, marshes and landfills are not compatible with aircraft operations. Operations of landfills, evaporation ponds and wetland projects should not be allowed within 10,000 feet of the centerline of the runway

## **BIRD PROOFING**

### **ABSTRACT**

**Birds can create serious health and safety risks for workers. Many of our homes, office buildings and warehouses are old and not designed bird proof. Many controllable factors are discussed but the underlying principles are to deny birds food, water and access to resting/nesting areas. Various "tools" are discussed including grounds and building maintenance, landscaping, personnel management, chemical deterrents, poisons, and shooting or trapping.**

Birds can damage homes, public buildings, office buildings, outdoor areas like parks and zoos, malls, and warehouses and create serious health and safety risks for workers. Bird proofing is essentially the flip side of conventional bird management. The intent of bird proofing is to reduce the suit-

ability of the habitat to discourage birds from using our facilities.

Several factors should be considered in bird proofing. Since many of our facilities are old, we do not have the luxury of getting with the architects and designing birds out by exclusion, elimination of resting and nesting sites, and by elimination of water and food sources. Nor do we usually have much input into the landscaping of surrounding areas, land use or the siting and selection of light standards, power lines, etc.

Knowledge of the factors encouraging a bird to become a pest is a starting place. Birds are like people in many ways -- they need food and water, a place to rest, and a quiet place to nest. Our homes and buildings are usually short on food and water but are long on roosting and nesting opportunities that are often within easy commuting distance of food and water. **Treat birds like unwanted relatives. Don't feed them. Don't let them have access to water. Don't let them get comfortable.**

Grounds maintenance and vegetation control should be designed to keep habitat, nesting material, food, and water at a minimum. Careful selection of landscape materi-

height between 7-14 inches. This zone should extend from the runway edge to the outer margin of the clear zone.

An outmoded ground maintenance practice was to mow the grass at four to eight inches on a 15-20 foot strip along the edge of the runways and taxiways. This practice resulted in creation of an ecotone consisting of a short grass feeding area attractive to mice and other small mammals that lived in the adjacent taller grass. This activity attracted hawks and other predators increasing the potential for aircraft bird strikes. This mowing practice was to make sure the runway and taxiway lights were visible to pilots in the daytime. Since airfield lights are not needed in the daytime, what appeared to be a good safety practice actually increased the potential for bird strike hazards.

Another misconception about proper airfield maintenance is the practice of using herbicides or using other types of grass control around runway and taxiway lights. This practice creates an ecotone and increases the birdstrike potential. It also allows the wind generated by passing aircraft to erode dirt and rocks from the cleared area around the lights. Rocks and other windblown material

eral feet into each habitat. This is much like living close to work where birds and animals can live in the trees and hunt in the adjacent grassland. Elimination of the ecotone and its edge effect is the best method of modifying bird behavior around airfields. Airfields mitigate the edge effect by providing a uniformly mowed, wide lateral clear zone from the runway edge to the trees, fence line or other boundary. A clear zone for approaching and departing aircraft is provided at end of each runway. The clear zones are designed large enough so that aircraft are high enough not to interact with birds using adjacent trees or grass. The clear zone also provides an area free of obstructions in case the aircraft develops problems and cannot stop on the pavement.

Airfields, with the exception of most runways, taxiways and parking ramps, are planted in grass. Grass stabilizes the soil, which reduces dust that can reduce visibility and other material that can become airborne to possibly damage jet engines. The open grass areas can create microhabitats for groups of birds and animals. To minimize the number of microhabitats a monoculture of grass should be maintained at a uniform

als should further reduce the desirability to birds.

The presence of aboveground power lines, streetlights, and lighting standards, ledges, exposed beams, and the edge of the roofs often provide a staging area prior to bird's entering a hangar. These utilities should be eliminated if possible or made less attractive to birds by the installation of bird repellent devices or fixtures that the birds cannot use for perching or nesting. Elimination of mercury vapor lighting will reduce the insect population that attract insect-eating birds and annoy people. Insect reduction will raise morale and can increase productivity.

It may sound simple, but the best way to control birds inside of building is exclusion -- keep the birds out. Keep all doors closed as much as possible. Where the doors must be open for long periods several options can be tried. Netting or other inconspicuous barriers hanging down several feet below the top of the doorways will inhibit birds from swooping in just under the top of the doorways for a short time. The use of full-length plastic or other curtains such as 40mil plastic used in super markets will allow the use of the doorway to equipment and

people while excluding birds.

In warehouses sheet metal seals installed on the top of the door joints will eliminate an entry point. This will require training of the people that open and close the doors to control the overlap of the door sections and not destroy the seals. High morale and pride of ownership are important to proper warehouse operation. Maintenance of weather-stripping on the doors and elimination of holes, loose panels, and other potential bird access points will also help keep birds out -- look up during the day and eliminate any point of light.

One option for eliminating the perches and nest sites inside warehouses is netting selected areas. Netting is both costly and maintenance-dependent, but can be very effective in small areas. The use of netting requires training of personnel on how not to damage the netting while managing the doors, driving equipment, and performing house keeping. Prompt repair of damaged netting is important to bird exclusion. Rodent damage to the netting needs to be noted and promptly corrected.

Chemical bird deterrents such as the hot foot chemicals are often effective, but re-

they go away." This principle applies equally to mice, crabgrass, birds, in-laws, and other pests.

Since we, as civil engineers, cannot do much about aircraft design or operations, our best effort is to try to control the immediate airfield environment. To do this we must understand some basic ecology and use a toolkit of techniques to do what is essentially negative wildlife management.

Exclusion would be the best solution, but anything that could keep birds off the airfield would probably prevent aircraft from taking off and landing. Voodoo might work if an itinerant witchdoctor were available, but a paradigm shift works better. We spend a lot of time and money on various harassment techniques and the maintenance of airfields, but all this money and effort may not get at the root cause of why birds are there.

The most popular living situation for birds and animals is in an ecotone. An ecotone is a narrow band where two or more habitats meet. The "edge effect" is the environmental impacts caused by this habitat interaction. For example, an ecotone is created where the edge of the trees meets the edge of a grassland. The edge effect extends sev-

the earth” helicopter flights birds can be pulled out of the trees into engines, rotors and bottoms of the aircraft.

Most of these incidents result from birds that weigh from less than an ounce to a few pounds. Lets look at the math involved and compare a bird with a bullet.  $F=1/2 \text{ mass} \times v \text{ squared}$ . A 1lb 20mm round with a closing speed (800 fps muzzle velocity + 500 mph or 600 fps aircraft speed) of 1400 fps has an impact of 980,000 pounds. A seven-pound vulture colliding with a 500 mph aircraft has an impact of 1,260,000 pounds. An 80-pound deer hit by an aircraft at 80 mph on a takeoff run. The impact is only 250 pounds but it recently did \$7500 damage to a T-37 front landing gear.

The Air Force Bird/Aircraft Strike Hazard (BASH) office, the US Department of Agriculture and state Animal Damage Control offices have integrated airfield safety programs whose goal is to reduce bird and wildlife strike hazards.

Like the rest of the integrated pest management program, the principle of bird hazard prevention is to treat them like unwanted relatives. “If you don’t give them a place to rest or sleep and don’t feed them,

quire periodic replacement. These work particularly well where birds must be denied the use of specific areas within a hangar instead of treating the whole area. Chemical deterrents are temporary fixes and often cause secondary maintenance problems. They can be expensive to install and remove. They are particularly effective in small, easily accessible areas. Chemical deterrents are ineffective or short-lived if exposed to the elements.

Poison perches and baits work well inside warehouses. All types of poison operations are manpower intensive and can kill non-target species. Poisoned birds can fall up to a half-mile from the treatment site. Non-target and secondary or tertiary poison deaths can result in adverse publicity and possible notice of violations and prosecution.

Active bird control techniques, such as shooting or trapping, are long-term for the birds but short-term fixes for our facilities. An expert with a pellet gun equipped with a telescopic sight should do any shooting that is required. Shot guns and rifles can puncture a very expensive roof and could injure personnel. A resident bird population may have to be eliminated to allow exclusion to work. Trapping and shooting are labor intensive

and require skill, dedication, and perseverance.

Painting the ceiling a light color, the installation of a light colored reflective floor treatment and the use of upward projecting lights may improve efficiency but will not discourage birds and is a short-term solution at best. This will, however, increase available interior lighting and reduce the need to open the doors.

It is important to consider the use of recorded distress calls, flashing lights, strobes, sirens, ultrasonic or other electronic scare devices, and the use of the big-eyed balloons, rubber snakes, stuffed owls or even naphthalene blocks. Please keep in mind that their use has only a temporary impact on birds but are not long lasting and may be disruptive to your work force.

If in doubt or if you have questions, please call your Master Gardeners or your local APHIS Wildlife Services biologist.

### **The Bird-Wildlife/Aircraft Strike Hazard (BASH) Program as a Process**

Every year about 3000 military aircraft are damaged by bird and animal strikes at an average cost of \$25,000 each. A few aircraft crash and occasionally a person dies as a result of aircraft colliding with birds and other animals. Birds, deer and other animals are also struck during takeoffs and landings. You might not think a little bird or even a seven pound vulture or a 80 pound deer could damage a 50,000 pound aircraft but they do with surprising frequency.

The damage depends on closing speed, mass and density of the bird/animal hit, design of the aircraft components, and where the aircraft was hit such as wing, engine, or canopy. Aircraft surfaces can be dented. Control surfaces jammed. Engines are destroyed. Windscreens, canopies and radomes are broken. During low level "nap of

pers will eat the dead grass, wall paper, and clothing when they are hungry.

f. erect a sign telling the pilots to watch for birds? Pilots might not have time to read signs and drive airplanes fast at the same time. The signs would be an airfield obstruction and something else for the birds to perch on.

g. program a drainage improvement project? This would be the long-term solution.

Now we have changed our paradigm.

We walked through a hypothetical BASH situation and arrived at some reasonable workable solutions. Someday I hope this will be the norm rather than the exception on every base. Until then, keep'em flying.

## Bird Strike – Buzzard's View

Sunrise and a 0730 launch  
from a 44,000 volt urban buzzard roost  
finds a cool, damp sky.  
Another damp-feathered, bad-lift morning.

Wing-wobbling circles at shrub top and  
navigating through the trees  
leads to a thermal from a blacktop road.  
This shallow vortex lifts me above the trees.

Another thermal is forming over an airfield runway  
from heat retained from yesterday's sun.  
I turn in tight and climb to 300 feet  
circling in the clear blue sky.

The now sun-warmed thermal rises  
lifting friends and I to 2500 feet  
where we cruise and search for food  
by sight and scent.

Riding a column of air where a feather flip  
matches gravity's pull and aerodynamic lift we float on high  
inspecting fields and bush and scattered trees for signs of death,  
searching highway right-of-ways for roadkill.

A low frequency hum announces a metal bird,  
a mere speck on the horizon,  
that is ignored until the next orbit.  
The speck has become a spot.

Another orbit finds a rumble, an approaching roar  
and the growing spot reflecting sun in quivering flashes.  
Be alert. How shall we evade this intruder  
closing at 400 feet per second?

A panic dive with ruffled feathers.  
Bank left. Now right. Evade the ----

3. Remove the food source by:
  - a. herbiciding the airfield? Herbicide kills herbs or plants not grasshoppers.
  - b. herbiciding the fence line? Herbicide does not work well on mature grass. The grass is ready to die anyway, and, besides, herbicide would not eliminate the seeds.
  - c. forget the fence line and concentrate on eliminating grasshoppers on the airfield? Very good! You're getting warm.
  - d. buy more propane cannons? Where did this come from? Cannons are not the solution to all your bird problems.
  - e. spray the areas with a contact insecticide to kill the grasshoppers? This could result in secondary poisoning and adverse publicity not to mention possible legal problems. Use herbicides to eliminate the grass and grasshoppers? Herbicides would kill the grass and could denude the area causing dust and FOD and attracting some birds species to the bare spots. Grasshop-

long as you keep your airplane on the runway.

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2. Shooting the birds will:

a. teach them durn birds to stay offen the airfield? Neither the live or dead ones learned much.

b. create a vacuum that will be filled by other birds through recruitment? Definitely. The new birds won't know anything at all about avoiding the runway.

c. possibly kill a threatened or endangered species? Big fines and crossbar hotel time.

d. scatter shot (FOD) on the runways? Anyone for tossing little steel ball bearings into your engine?

## INTEGRATED BIRD STRIKE PREVENTION The Way it Could Work

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The airfield is a dangerous place. There may be several hundred birds on the airfield you don't see for every one you do see. About a third of all aircraft bird strikes occur on the airfield, and most of these are from the unseen birds. Many more non-bird strike bird deaths result from being caught in the clear air turbulence from slipstream vortices or jet engine turbulence. The airfield manager may pick up several dead birds each day killed by passing aircraft. The question is how to reduce bird strikes on our airfields and injuries to birds.

Exclusion would be the best solution, but anything that would keep birds off the air-

field would probably prevent aircraft from taking off and landing. Voodoo might work if an itinerant witchdoctor were available, but a paradigm shift works better. We spend a lot of time and money on various harassment techniques and the maintenance of airfields, but all this money and effort may not get at the root cause of why birds are there.

Let's look at bird and wildlife control as a process. This process includes using many common techniques of wildlife management, habitat or behavior modification, plus a few that are not so common. All of these services may not be available or even needed on every base.

About ten o'clock one fall morning on Hypothetical AFB, the airfield manager drives the active runway and finds several dead birds. These are noted in a log, picked up with tongs and put in zip-lock plastic bags. Tongs are used to keep the mites and other critters on the birds from getting on the people. The plastic bag is to keep the critters from infesting the truck.

Returning to ops the manager calls the bird control officer and turns the bird over for study. The bird control officer (could be the natural resources manager) looks at the log,

firming the presence of a large number of grasshoppers on the airfield. They occur only in a swale that has better soil and greener grass than the surrounding areas on the airfield. Periodic sweep net surveys, use of pheromone sticky traps or light traps and consulting other forecasting tools on base or in the local area will help predict population peaks. This information is used to determine if an action populations count for insecticide application exists. Coupled with direct observations this information may indicate the need for other actions such as a drainage correction project or fence repair to eliminate deer on the airfield.

Let's try another multiple guess test.

1. What would be the most effective treatment to control the birds:
  - a. shoot all the birds along the flight line? See the same question above. Same reason applies.
  - b. eliminate the Johnsongrass. Probably a good idea, but if the birds were in the fenceline we wouldn't have a problem so

How long would this cover stay in place with aircraft operations?

4. Get the vacuum truck to pick up the gravel? Might work but not really practical.

5. Spray the gravel area with oil emulsion? This is what our airfield engineer recommends. The oil makes the gravel stick together and makes the gravel taste bad. This has minimal impact on the grass but would eliminate a reason for the birds to be present on the edge of the runway.

Now we visit the second site where the crop analysis of birds 2 and 3 showed 10% Johnsongrass seed and 90% grasshoppers. Knowing the airfield intimately or consulting the base's GIS data layer on vegetative cover on your laptop computer, you find Johnsongrass occurs in the fenceline a quarter mile away. Knowing the feeding behavior of this bird, you decide grass seed is not a determining factor.

Next, your expert gets out a special insect net and takes a short walk through the area. The walk and sweep net survey con-

makes a tentative identification of the birds, performs a necropsy and prescribes corrective measures. He or the flight safety officer fills out a bird strike report (AF Form 853) and sends the form along with feathers, feet, beak and other non-putrescible bird parts to Dr. Carla Dove for confirmation. Just like going to the doctor for a cold.

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What information is relevant? What is the decision making process? The log said BIRD 1 was found as a fresh kill at the 3000-foot marker of RW06L and BIRDS 2 and 3 were found at the 6000-foot marker on RW23R. All the birds appeared to be Eastern Meadowlarks. Networking with another base 200 miles northeast had forecast the arrival of this species to within a few days. The necropsy showed BIRD 1 had no food in its crop, but its crop did contain fresh gravel. Crop analysis of BIRDS 2 and 3 showed crop contents to be 10% Johnsongrass seed and 90% grasshoppers. The county agent's insect trend analysis indicated an increase in the grasshopper population in the local area.

Necropsy? Crop analysis? Insect population forecasts? Necropsy is the examination of the dead birds. The crop is the bulge in the esophagus that contains gravel or "grit". The grit helps break up seeds and other food so it can be digested much more easily. Food is slowly passed through this muscular organ on its way to the stomach. Analysis of crop contents can indicate what has been recently eaten and where the grit and food came from.

The county issues periodic insect population trends and forecasts based on various types of trapping, historical data and local weather forecasts.

Now you can visit the sites where the birds were found to determine why they were there and what can be done to prevent the possibility of their bird brothers and sisters from being ingested into engines. Lets have a little multiple guess quiz on possible solutions.

1. Brief the pilots to land and takeoff short to avoid these areas? Don't think this will work.

2. Look at the areas where the birds were found and try to determine what attracts

birds there? What a novel idea! Let's try it.

Driving up to the 3000-foot marker of RW06L you notice several doves and a couple meadowlarks on the edge of the runway and in the grass along the runway edge. The airfield here looks like the rest of the airfield but there has been some work on the runway margin and you find some small gravel that had been swept off the runway. These rock particles are the same size and shape as the grit in the crop. What next?

1. Move some cannons to this location? OK as part of a short-term solution. If cannons are in your BASH toolbox, use them.

2. Get out the shotguns and shoot everything in sight? This might work if you intend to move out on the airfield for the duration. The birds were there for a reason and will return as long as the reason exists. Besides, you might shoot an endangered species and wind up sharing a cell and a big fine with the wing commander. Bad idea.

3. Cover the grit with topsoil or sand?