UNITED STATES AIR FORCE
FSM
SEP 2007
FLYING SAFETY MAGAZINE

BASH

Bird / wildlife Aircraft Strike Hazard

Him too!

see page 4

FSM
FLYING SAFETY MAGAZINE

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contents

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SAFETY SAGE

CSI Smithsonian

This year's BASH articles highlight the processes needed to identify birds with new technology. Deployed operations have added a new challenge to BASH programs from printing posters to getting bird remains shipped for identification. Bird strikes have cost the US Air Force $35 million dollars annually since 1985. Species data is necessary to provide information to engineers and design teams to build better windscreen for aircraft. Additionally, the data is vital to develop bird avoidance models (BAM) and avian hazard advisory systems (AHAS) allowing aircrews to better predict bird strikes. We are privileged again this year to have articles written by Dr. Carla Dove and Marcy Heacker, of the Smithsonian Institution, National Museum of Natural History, Feather Identification Lab, Washington, DC. Knowledge is power, and prevention is the key to success!

Smithsonian

DEPARTMENT OF THE AIR FORCE — THE CHIEF OF SAFETY, USAF

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SNARGE BUSTERS

Smithsonian

CARLA J. DOVE AND NANCY ROTZEL
Smithsonian Institution
National Museum of Natural History
Feather Identification Lab, Washington, DC

USAF Photo

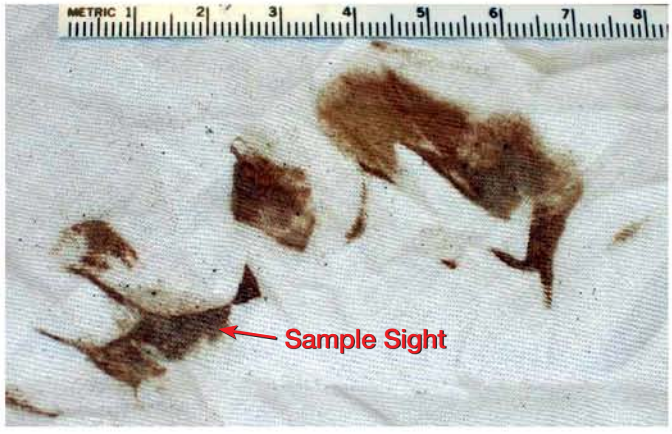
For more than four decades, military and civil aviation safety personnel have been sending bird remains recovered from bird aircraft collisions (bird strikes) to the Smithsonian Institution's National Museum of Natural History for identification. In the early years, whole feathers, partial carcasses, and a variety of bird parts were sent to the museum for species identification.

Smithsonian

Whole feathers and feather fragments are washed to regain their natural shape, color, and texture, and then they're compared to the museum's vast research collection of some 620,000 specimens for an exact species match.

Smithsonian

As time passed, the bird evidence became more and more, minute–small bits of fluffy feather down wiped on a paper towel or saved in a barf bag found its way to the Feather Lab.



Smithsonian

More recently, airfield personnel and safety offices have become expert detectives and are so good at finding bird strike evidence that sometimes only blood and/or tissue (otherwise known as 'snarge') is available after birds and aircraft collide.

Now, the Lab's team of three–Carla Dove, Marcy Heacker, and Nancy Rotzel; otherwise known as the 'Snarge Busters'–are combining new technologies with old skills to positively identify species of birds involved in birdstrikes.

Smithsonian

In 2003, the Feather Identification Lab at the Smithsonian Institution joined forces with the Federal Aviation Administration and the US Air Force (USAF) to add a new 'tool' to the arsenal of techniques used to positively identify bird strikes that only contain minute blood and tissue evidence. That new tool is……. DNA.

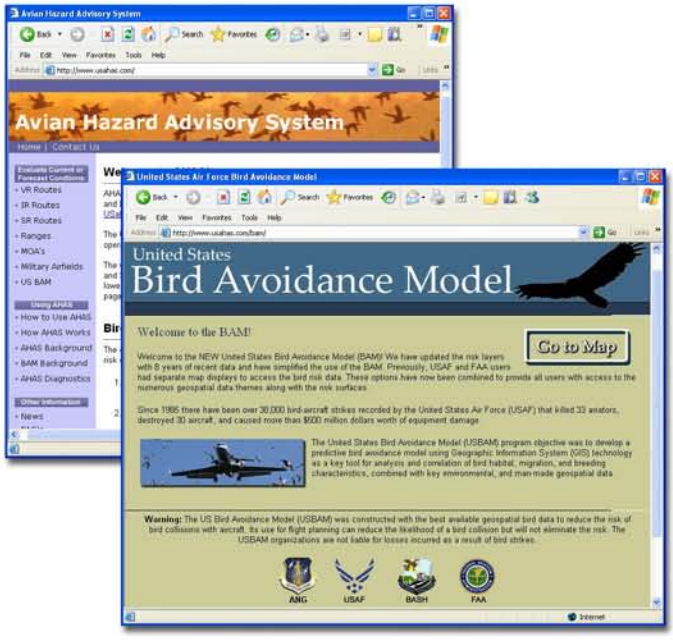
Birds comprise about 98% of all wildlife strikes.

Smithsonian

Bird strikes have cost the USAF about $35 million annually since 1985. What kinds of birds cause this kind of damage? The only way to be sure is to send in the evidence and have the species positively identified using the gamut of tools now available.

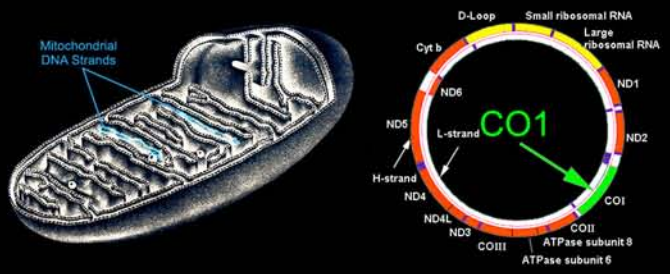
USAF Photo / Photo Illustration by Dan Harman

Although the usual suspects are larger birds such as gulls, waterfowl, and hawks, you might be surprised to know that a bird as small as a golden-crowned kinglet (6.2 g) caused more than $74,000 damage to a B-2 bomber. On average, small perching birds cost the USAF $1,000/strike, so YES, every bird identification is important. The number of bird strikes reported by the USAF continues to rise and now tops 5,000 strikes annually. While other wildlife such as deer, wild dogs, coyotes, and bats present hazards to aircraft, birds comprise about 98 percent of all wildlife strikes.



Several factors contribute to the rise in bird strike reporting: increased awareness of bird strikes through dedicated wildlife hazard mitigation specialists, increased aircraft operations, and increased population of birds. Other factors, such as the ease of on-line birdstrike reporting, educational training, and accurate, timely species identifications undoubtedly also contribute to higher reporting rates.

About 50% of the cases received in the Feather Identification Lab are still identified quickly and accurately, using the whole feathers recovered from the strike in comparison with the museums' collection of bird specimens. If, however, the sample contains 'snarge,' it now goes directly to the DNA lab for processing and possible identification.



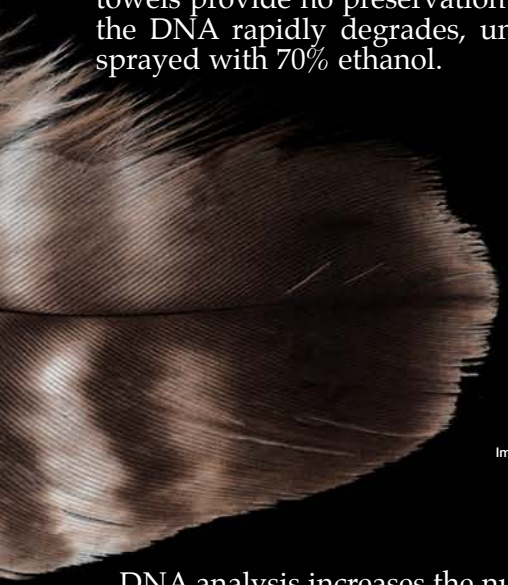
DNA Identification Process. We selected the 'barcoding gene,' a small fragment of a mitochondrial gene known as cytochrome oxidase 1 (CO1) as our target DNA marker for our birdstrike identification database. Sequencing the CO1 gene (a 650-base pair region of mitochondrial DNA) for all of life on earth is now part of a global initiative called the Barcode of Life Database (BoLD), with a goal of having all 10,000 species of birds completed by 2010. BoLD now contains sequences for 94% of the bird species of the US and Canada.

To process an unknown sample, first, the 'snarge' is sampled, the DNA is extracted, and a million copies of the barcode gene are amplified. Then the DNA is labeled with fluorescent tags, which are analyzed by a DNA sequencing machine. The unknown DNA sequence is finally compared to the on-line BoLD for species identification.

During Fall 2006, the Feather Identification Lab tested this DNA database by submitting over 800 samples that contained only tissue, blood, or non-diagnosable feather fragments for identification using DNA barcoding. The DNA analysis provided positive species identification in over 68% of those cases. The identified cases for this short period of time comprised of 128 species representing 14 orders of birds.

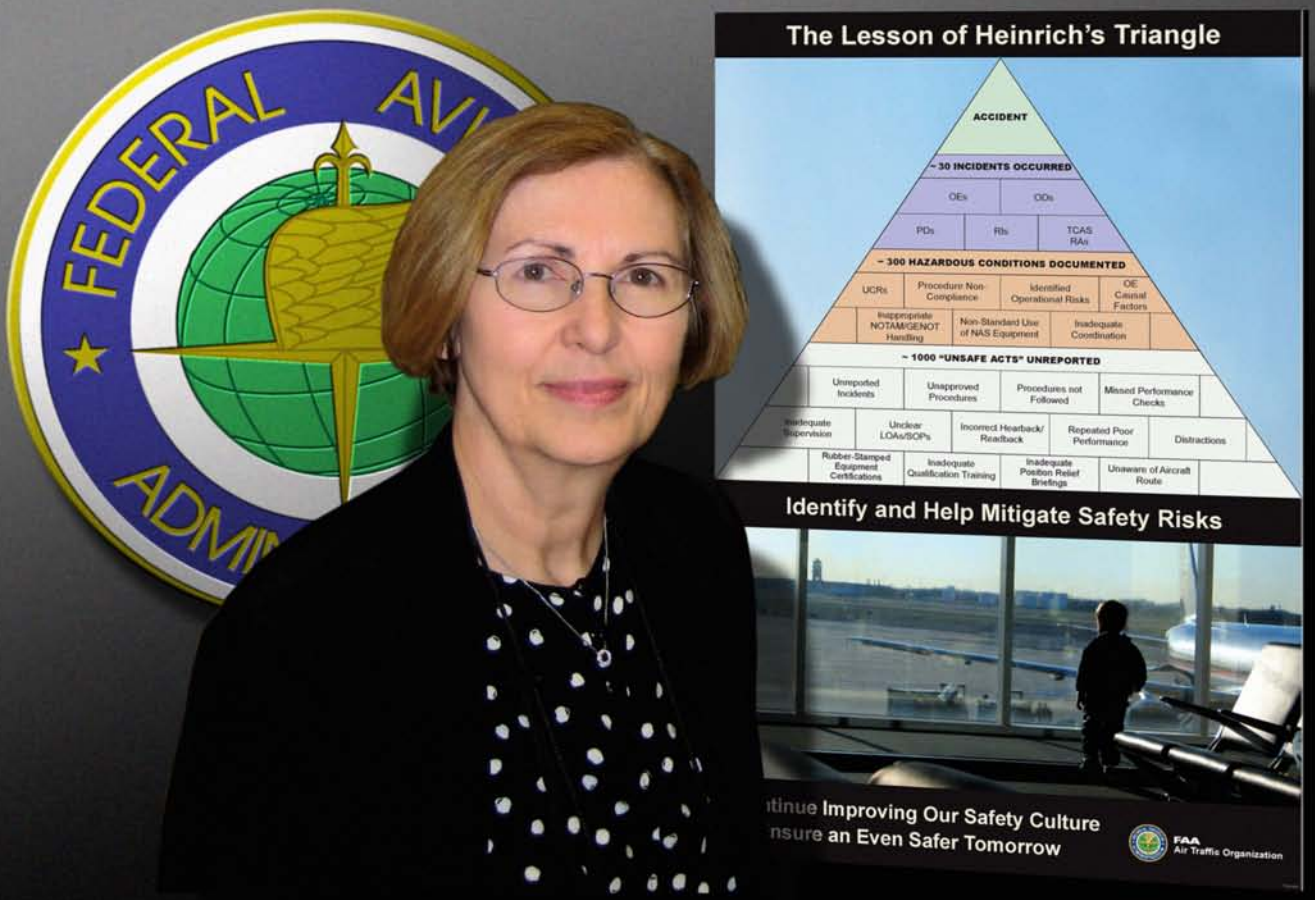
Although DNA technology is considered a major breakthrough for birdstrike identifications, we still rely on microscopic methods in about 32% of the cases, because not all of the cases submitted for DNA analysis contain viable DNA.

The types of material that most often failed at DNA extraction included samples that contained mold or were received on paper towels. Mold growth takes over the tissue sample, making it difficult to find material for DNA analysis. Paper towels provide no preservation to the sample, and the DNA rapidly degrades, unless the sample is sprayed with 70% ethanol.



Imagery Courtesy of The Smithsonian
Photo Illustration by Dan Harman

DNA analysis increases the number of submitted samples that can be positively identified, thereby enhancing the amount of available accurate data. Precisely identifying what wildlife our aircraft strike and properly reporting where and when the strike occurs, enables others to specifically research, develop, and enhance programs which will effectively and efficiently target and mitigate the "culprits."



Safety Culture in the Next Generation Air Transportation System

JOAN DEVINE
Federal Aviation Administration (FAA)
BARRY SILVERMAN
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Photos Courtesy of Author
Photo Illustration by Dan Harman

The Next Generation Air Transportation System (NextGen) is an initiative intended to transform the United States air transportation system by 2025. In contrast to today's system, NextGen will be more flexible, resilient, scalable, adaptive, and highly automated. It will include security, safety, and efficiency of passenger, cargo, and aircraft operations. Aircraft will be able to use information technology more vigorously, with enhanced capabilities in the cockpit, better navigation, and landing capabilities (such as the use of four-dimensional trajectories, and the provision of vertical guidance on all instrument approaches), and far more comprehensive and accurate knowledge of weather and traffic conditions in real time.

NextGen must accommodate an expected threefold increase in traffic, including commercial airliners, military, charter, and air taxi, and other general aviation. Merely maintaining the current level of safety, as measured by the accident rate per departure, would lead to a large increase in the number of accidents, which is not acceptable. Thus, for NextGen to succeed, the air transportation system must become safer. Even if the amount of air traffic doesn't increase as drastically as expected, factors such as increased globalization, changing business models, and increased public expectation for safety are likely to lead to significant changes in the air transportation system. The Safety Working Group of the multi-agency Joint Planning and Development Office (JPDO) was tasked with creating a comprehensive national-level aviation safety management framework for NextGen. Examples of JPDO agencies are Department of Defense, Department of Transportation, Department of Homeland Security, NASA. An important element of this framework is the establishment of standards and guidance to be used by the JPDO agencies and other stakeholders. The proposed standard includes the requirement that organizations "promote the growth of a positive safety culture."

The Safety Services unit of the FAA's Air Traffic Organization (ATO) leads the Safety Culture Project Team of the JPDO Safety Working Group. As the

leader of this initiative, Safety Services will leverage the lessons learned from the ATO's efforts to move its workforce toward better reporting, learning, flexibility, and just behaviors. The Safety Culture Project Team is also engaged in presenting safety culture briefings to the Safety Working Group, conducting safety culture workshops for JPDO working group leaders, developing goals and measures, and defining future research needs.

In August 2006, the Safety Culture Project Team held a safety culture workshop for JPDO working group leaders. The Naval Safety Center's Director of Aviation Safety Programs, along with two workshop facilitators, conducted a simulation of the safety culture workshop that the United States Navy has developed for naval aviation. The Navy has had great success with this program, finding that the 64 percent of squadrons that conducted a workshop, accounted for only 15 percent of all major mishaps. These workshops include interviews and facilitated group sessions, which bring out safety issues that are not always apparent from survey results. Interviews are conducted at all levels of the squadron. The workshop demonstrated the Navy's approach to changing culture. Participants formed small groups and discussed not only how the FAA and other JPDO agencies could incorporate these practices in their own organizations, but also culture topics relating to the JPDO.

The main product of the Safety Culture Project Team will be a Safety Culture Improvement Plan, which will include tools and recommendations for strengthening the safety culture of the JPDO agencies (including oversight organizations) and industry. This plan is not an implementation plan, but will provide tools and guidance to assist stakeholders in strengthening their own safety cultures. Each JPDO agency is responsible for developing its own implementation plan, including the allocation of appropriate resources for safety culture improvement. The agencies will tailor the plan's tools to meet their needs. As the JPDO agencies develop lessons learned in enhancing safety culture, their own safety plans can be updated with best practices. Safety Services will continue to provide subject matter expertise to the JPDO during implementation, and will maintain and update the plan as appropriate.

As an example of a tool included in the plan, the Safety Culture Project Team has developed a list of objective criteria that can be used to assess safety culture. These objective measures check for the presence or absence of certain key elements of a positive safety culture. Criteria were selected by gathering characteristics of positive safety culture and processes of maintaining a healthy safety culture, from agencies and companies that have had success in this area. The objective criteria are organized into five main areas:

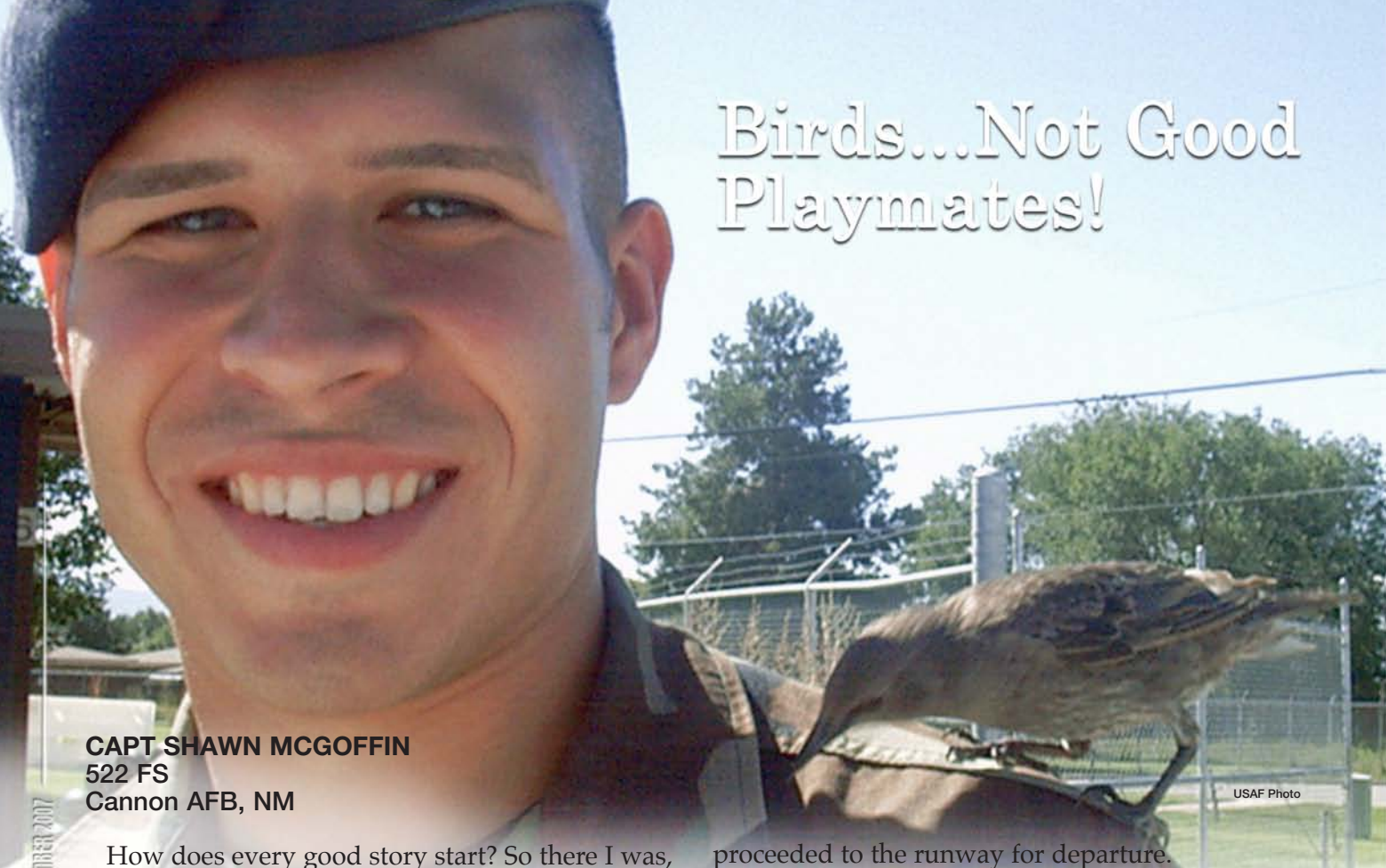
1. In-house Hazard Reporting–how safety information is provided by employees, and how the organization gathers, uses, and disseminates safety data.
2. Safety Organization – how safety fits into the company or agency structure.
3. Training–the safety training and feedback that the organization provides to its human resources.
4. Senior Management Involvement – the extent to which senior managers consider safety issues in decision making, finances, and education.
5. Workshops–the improved ability to identify weaknesses in communication, integrity, and trust (guidelines for conducting workshops will be included in the Safety Culture Improvement Plan).

Review of the criteria by safety experts from government agencies, the military, airlines, and industry made clear the desirability for flexibility to allow organizations to tailor the list of criteria to their own situations and organizational structures.

An example of a safety promotion activity developed by Safety Services is a poster displaying the "Lesson of Heinrich's Triangle" Adapting Heinrich's concept to an air traffic control application, the poster illustrates how an accident is preceded by a large number of known and unknown unsafe acts. Copies of this poster were provided to every air traffic control facility to be displayed near the operating quarters as a reminder that seemingly small behavioral variances from approved practices can culminate in accidents and incidents. Based on the overwhelming number of international and domestic examples of effective safety culture interventions, research findings to date illustrate that the ATO can put the "Lesson of Heinrich's Triangle" into practice by implementing a voluntary reporting system to strengthen the organizational safety culture.

NextGen's computerized air transportation network will stress adaptability by enabling aircraft to adjust quickly to factors such as weather, traffic congestion, and security issues. By 2025, all aircraft equipped with data link capability along with airports in US airspace will be connected to the NextGen network, and will continually share information in real time to improve efficiency and safety, and to absorb the predicted increase in air transportation. To ensure that safety is maintained, the implementation of safety management systems throughout the aviation transportation system is planned. Within the framework of the multi-agency JPDO, the Safety Services unit of the FAA's ATO is working to establish a strong safety culture for all stakeholders in NextGen, to enable successful implementation of these safety management systems. However, continuous monitoring and assessment of safety culture will be needed, as will continued research into the safety implications of innovations such as shared responsibility for separation, the use of four-dimensional trajectories, and dynamic airspace allocation.

Birds...Not Good Playmates!



USAF Photo

CAPT SHAWN MCGOFFIN
522 FS
Cannon AFB, NM

How does every good story start? So there I was, number two in a two-ship Surface Attack Tactics (SAT) ride in the F-16CJ at Cannon AFB, New Mexico. My flight lead and I were supporting a Flight Lead Upgrade (FLUG) Destruction of Enemy Air Defenses (DEAD) sortie. Also, what made this ride even more eventful, in my mind, was the fact we were both carrying a single GBU-12, 500 lb laser-guided bomb. This was a big deal for our squadron, because we don't get the opportunity to drop heavy weapons very often.

The mission was briefed up without incident, because in fact, this same FLUG had briefed this very same ride on three deferent occasions. This wasn't because he didn't know his stuff. It was because each time the weather was bad, or he had some sort of aircraft fallout.

So, the plan flowed out like this. My flight lead and I were going to take off first, flow into range, do our Laser Guided Bomb (LGB) attack, and drop our bomb, followed by some quick strafing runs. After, we would climb out and flow to our hold point for our DEAD mission. The FLUG four ship was going to take off 10 minutes after us and flow into the airspace while we were in the range.

We all stepped on time and did our pre-flights and started. About the time I started and tuned my radios, the ops frequency was already in full force, calling out Red Balls and trying to get maintenance where they needed to go. Finally, we sorted out all our problems and started our taxi to the End Of Runway (EOR). We armed up uneventfully and proceeded to the runway for departure.

At the departure end of Runway 31, we had to wait for some last minute airfield changes, but nothing out of the ordinary. The only thing that had changed since the brief was another FLUG sortie was going to take off before us. Also, the Supervisor Of Flight (SOF) had issued Bird Condition Moderate for the airfield.

At the briefed time, the first four ship of Vipers took off and proceeded to the Military Operating Area (MOA) uneventfully. About 4 minutes later, my flight lead and I took to the runway for takeoff.

I need to mention my Takeoff and Landing Data (TOLD) for this mission. My rotation speed was around 160kts, liftoff 175kts, and I had a refusal speed of about 174kts. Also, unknown to me at the time, was that there was a flock of small birds camped out just to the NW of the runway intersection.

We received takeoff clearance and started our 15-second staggered After Brunner (AB) takeoff. Lead released brakes and rotated without incident, but as I released brakes and started accelerating down the runway, I was thinking about what I would do if something happened at rotation, before refusal speed, after refusal, before I climbed into the ejection envelope, and finally after I climbed into the ejection envelope. Something did in fact happen!

As I passed the 6,000 ft remaining marker, the flock of birds flew right in front of the airplane. At this point, I was passing through 174kts, refusal speed. I paused for a split second and then rotated the airplane. In that spit second, I can remember

passing through 184kts, as I pulled the aircraft off the ground with the smell of something strange in the cockpit (fried chicken). Also, there were no impact sounds.

As I climbed away from the ground, I frantically scanned the engine instruments. To my amazement, nothing was wrong; all seemed right. So I thought for a second about what had happened, and decided to inform my flight lead that I hit some birds. This was a huge step for me, because of the fact that I didn't hear or feel anything with the airplane, and I had a bomb on the jet I really wanted to drop.

Finally, I keyed the mike. "One, Two, I think I hit some birds on takeoff." At this point, things started to happen fast. We started a left-hand turn, directed the Simulated Flameout Approach (SFO) pattern at Cannon, and contacted the SOF to inform him of the situation, and what our immediate course of action was. My flight lead also looked me over and saw a blood mark on the right flap. At this point, I had no unusual engine indication, and the jet was flying well. So, I decided to burn down fuel and bring it in for a straight –in full stop.

At this point, I started thinking about the things that could go wrong. What if my engine flames out or seizes, or if I have gear problems or structural damage to the airplane? Orbiting the field at about 14,500 ft looking at the two runways, I started thinking about a similar mishap that happened about 4 months prior to a good friend of mine.

He was on departure from the same runway, when a hawk jumped out and hit his airplane. At first, he thought it was a compressor stall, but the fact that he saw something brown pass underneath his jet, reinforced the fact that he hit a bird, a big bird. He had usable thrust, so he began a climb to the SFO pattern above the airfield. Vibrations were felt, but at the time, he didn't deem it necessary to jettison his stores and didn't carry out a flame out approach to the field. His mishap ended uneventfully, but the damage done to the aircraft was in excess of 1 million dollars, which according to the Air Force, is a Class A mishap.

He briefed the squadron on his mishap, and what stood out to me, was what he would've done if his engine would've failed. He talked about extending his downwind SFO pattern, jettisoning his stores, and bringing the jet down for a landing. As I listened to him recall his mishap, I never thought that this same thing could happen to me.

As I circled the field, I thought to myself, "What will I do if the motor quits?" Each time the question came up, I had the answer, because subconsciously I had thought about it 20-30 times before. All thanks to a squadron mate that had taken a hawk through the engine, and who had taken the time and the energy to brief the squadron on what had happened to him and what he had done.

After circling the airfield for about 45 minutes, I decided it was time to put this jet on the ground. At this time, I did some last minute engine checks, throttle full mil, full AB, idle, and lots of intermediate settings. To my satisfaction, I thought this jet was good to leave the safety of High Key and proceed to a 10-mile straight-in full stop.

I started down out of 14,500 ft with apprehension, but I knew this jet needed to get on the ground. So I scanned my engine instruments vigilantly all the way through the approach. It so happened that when it means something, the best comes out of the performer, and this was my time to shine. My approach and landing were uneventful and likely one of my best. After all, everyone was watching.

At this point, the ride was over. I taxied to EOR where I shut down, and the fire crew looked me over to evaluate the extent of the damage. As far as I could tell, five or more birds hit the airplane. I had blood on the right flap, right Radar Warning Receiver (RWR) antenna, left external fuel tank, left Angle Of Attack (AOA) probe, and down the motor. My reward for bringing the jet safely home was a pat on the back and a free tow back to the chocks. But I would rather have that than a free parachute ride and a taxi to the hospital.

What I learned from this incident will stay with me for as long as I fly. First, go-no go decisions. Rotating was the right decision at the time, but when I reviewed my tapes, I had doubts. Should I have taken the jet airborne or not? I can say with confidence that I made the right decision. But, if I had heard impact noises, I probably wouldn't have taken the jet airborne. So, seriously think over what *you* would do in a split second critical phase of flight situation. You can do these scenarios 500 times in the simulator, but the first time it really happens, you have to be ready for it.

The second thing I learned from this whole ordeal is that the BASH program is alive and well at every base. Try and understand how it works and how it applies to your base. Also, keep in mind that this plan won't guarantee that you won't hit a bird during takeoff or landing. This plan is in place to only mitigate that risk. Cannon met or exceeded the requirements in reducing the impact of birds on flying operations.

Finally, I learned to recall past mishaps and incorporate the lessons learned into my own habit patterns. This sounds trivial, but that's exactly what I was doing, circling the field that day. Take everything the safety officer briefs you and stick it into your clue bag. Because the time may come when you are out of ideas with a sick jet, and the light bulb over your skull turns on, due to the lessons learned from a past mishap. The next thing you know, you're the hero. Think about that the next tine you read a mishap report or you're sitting in a boring safety meeting. That stuff might be worth listening to.

Combat Crew Fatigue

CAPT ANDREW P. GRAY
39 ARS/SE

All of us have heard the saying, "I'll get plenty of rest when I'm dead." People have been using it for as long as I can remember to swat away the fact that they are sleep deprived and in no condition to be performing the tasks assigned to them. Unfortunately, if we as aircrew take this to heart, especially in a combat environment, we might actually become the unlucky ones who wind up proving this theory.

As pilots, we have dealt with the issue of fatigue since we first started flying. The physical toll a long flight takes on your body is not something to mess with. After I started flying the tanker, I figured that since I was now in a crew aircraft that things might get better. I was wrong. Flying with a crew does allow you to share responsibilities, but you are still just as tired as you would be flying by yourself. This is especially true once you get into a deployed situation. There are many factors I as a tanker pilot have experienced that work against you while you are in a deployed location. First, you have to endure two long flights, sometimes 10 to 12 hours each, in order to arrive at your base. This alone causes such jet lag and fatigue that you are unable to fly missions for several days, and even when you are able to fly again, you still are in a sleep deficit.

The next factor that you have to deal with while deployed is the drastic change in environment. The locations that we currently deploy to are very hot, humid, and sandy. This is a far cry from the climates that most of us are used to. The impact this has on our energy level and our sleep patterns is apparent from day one. You are more lethargic and actually have a much more difficult time getting to sleep.

Finally the last major factor that affects your sleep and fatigue levels while deployed is your flying schedule. Depending on the luck of the draw, you could fly during the day and have to deal with the brunt of the heat, or you could fly at night and have to contend with everyone who is not on the night schedule, going in and out of the dorms, slamming doors, watching television loudly, and

"I'll get plenty of rest when I'm dead."

Photo by Michael J. Sanders

talking in the halls. Also the amount of times you fly per week could drastically increase your fatigue level. All of this just continues the constant attack on your alertness and productivity.

Now that we see how these factors (which are not the only ones out there) affect our sleep patterns and fatigue levels, let's look at what effects this could have on your ability to accomplish your mission. From a tanker standpoint, one of the worst things that could happen is not being able to refuel your receiver. If you are tired, you might not be paying close enough attention to the fuel panel, and before you know it, you could have a severely out-of-balance aircraft and not enough fuel in the proper tanks to refuel your customer. This inattention due to fatigue could cause a receiver to have to divert or possibly even eject. Now, not only did you not complete your mission, neither did your receiver.

Another example of the cost of being fatigued is the chance of navigational error. Everyone has heard about people typing in the wrong coordinates or just not paying attention and flying into an area that they are not supposed to be in. If you're tired, your concentration can lapse and then this scenario could easily happen to you. The fallout from such an error could be disastrous. On one hand you could fly into another area and possibly cause an in-flight collision, or on the other, you could fly into a completely different country and cause an international incident. The chances of this happening are quite high if you don't pay close attention to what you're doing and where you're going.

The last scenario we will look at is, in my opinion, one of the scariest. Imagine turning on to final approach, getting your gear and flaps down, and then falling asleep and waking up on short final. I've heard of this happening before and just can't imagine what I'd do in that case. Luckily from what I heard, this scenario ended well, but it's unacceptable to ever be fatigued to the point where you fall asleep during a critical phase of flight. Unfortunately, with the way deployments tend to go, I can easily understand getting to that point.

Now what can you do to make sure that this doesn't happen on your next deployment? From my experience, one of the best things to do is to get into a schedule and stick to it. If you can get your body into a set routine, then you'll have an easier time getting to sleep and staying asleep. Also use ear plugs, if needed, to help block the noise coming from the halls.

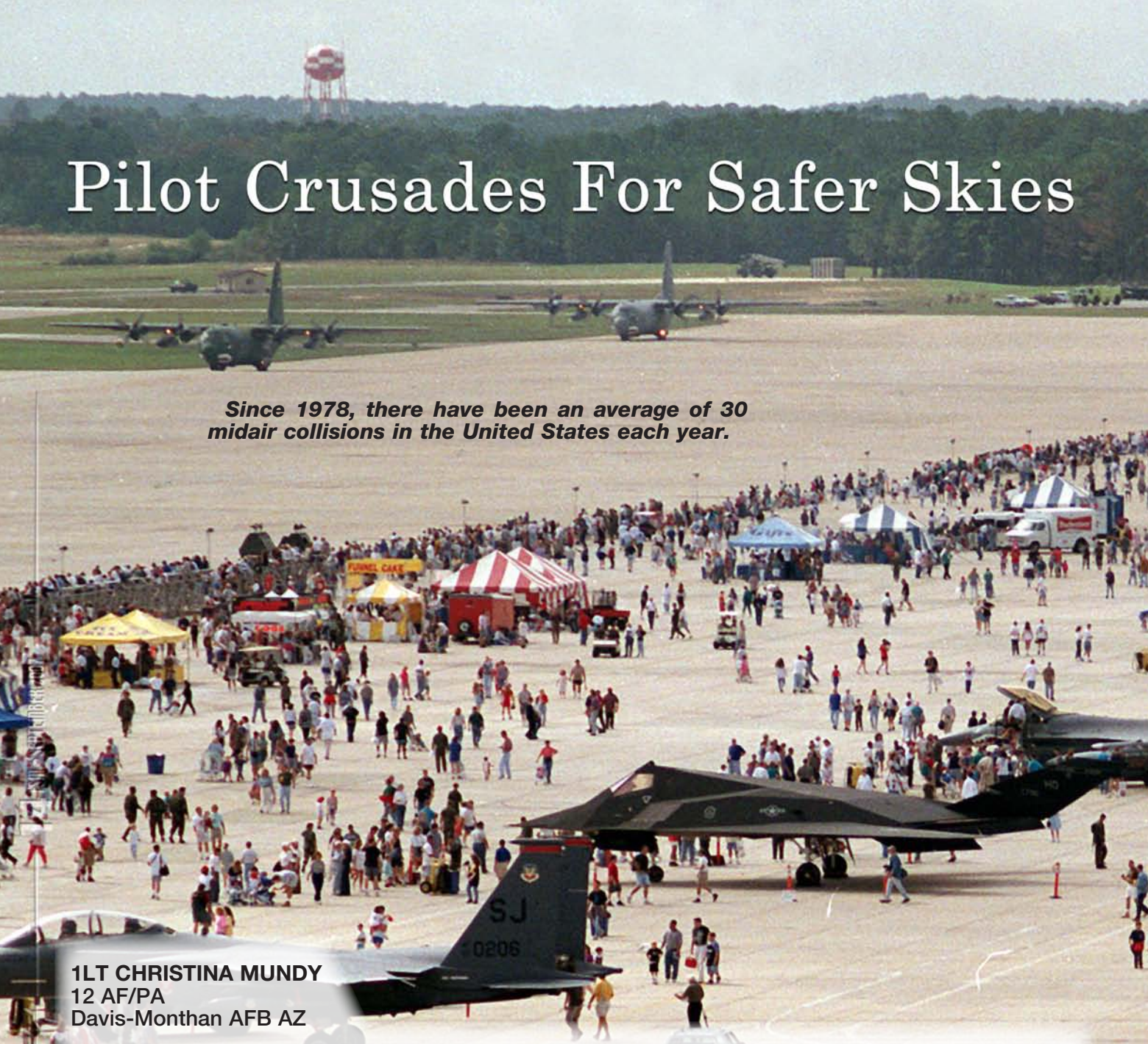
If you are still having a hard time sleeping, but you know that you have to fly and pull your weight in order to get the mission done, you can always go and see the flight doctor. He can provide you with sleep aids that will help you fall asleep and get some rest. The only problem is that you must be careful when you take the medication, due to the fact that you will be DNIF for a specified period of time. Also in some locations, it's not easy to get the flight doc to prescribe you the medication.

My last suggestion for what you can do, if everything else fails and you believe you're getting to the point where you can't safely accomplish your mission, is to tell someone. It falls on you to let your leadership know that you are fatigued to the point of being unsafe and you need to be off the schedule. If they can't take you completely off, then maybe the schedule can be readjusted in order to allow your crew the extra rest they need. In any case, you need to be vocal about your crew's fatigue level and ability to get the job done safely.

Fatigue has and always will be a problem for aircrews in deployed locations. Hopefully what was discussed in this article will help you become more aware of the possible causes of deployed fatigue and some of the things you can do to help mitigate the risk to your crew and the mission. Remember, we are all working together to get the mission done and if one piece of the puzzle is not there, the effects reach far beyond just our ability to not get a good night's sleep.

Pilot Crusades For Safer Skies

Since 1978, there have been an average of 30 midair collisions in the United States each year.



1LT CHRISTINA MUNDY
12 AF/PA
Davis-Monthan AFB AZ

One man's personal mission to help improve flight safety is making headway through the aviation community. Lieutenant Colonel Ned Linch, 12th Air Force Chief of Flight Safety, is an F-16 Fighting Falcon pilot with more than 4,000 hours in the cockpit of the F-16, experimental aircraft, and airliners. He's determined to work on reducing near misses and midair collisions between military and civilian light aircraft. "I have been on both sides of the coin," Lt Col Linch said. "I've had a near miss with an F-16 while flying as a civilian, and with more than 2,225 hours in the F-16, I've had two engine problems, yet multiple near misses with civilians, and lots of disrupted training due to civilians blasting through active special use airspace ... and in most cases, the civilian aviator was legal."

For several years, Lt Col Linch has been getting the word out to both military and civilian pilots on how to avoid close encounters and is now helping promote an Air National Guard-born and Department of Defense-sponsored web site called See-And-Avoid (www.SeeAndAvoid.org), whose goal is to eliminate midair collisions and reduce close calls through continuous flight safety and proper flight planning. Through Lt Col Linch's 22-year career, he has written numerous articles and has gone on various road trips to spread the word on midair collision avoidance, but after hearing about See-And-Avoid, he saw the great potential in it and is now a volunteer spokesperson for the organization. "I sent a message to SeeAndAvoid.org to see if they'd like me to help promote their web site, then I'd volunteer to fly out to the largest

"I have been on both sides of the coin ... a near miss with an F-16 while flying as a civilian ... in the F-16, I've had two engine problems ..."

Lt Col Ned Linch

Paula Rollins-Ritschel

air show in the country, (in) Oshkosh, (Wis.), park my experimental airplane next to an F-16, and hand out promotional materials," said Lt Col Linch. "(Air Combat Command officials) heard about the project and came back and said it was a great idea," he said, "so they are funding me to do just that. Along the way, several organizations joined in the project, including the Air National Guard Bureau, Defense Safety Oversight Council, Concurrent Technologies Corporation, and MacroSystems, to name a few."

The Oshkosh Air show runs July 23rd to 29th and is one of the largest air shows in the world. It'll host more than 700,000 people and 2,500 participating show aircraft. It is estimated that 10,000 to 15,000 aircraft visit Oshkosh each year during the fly-in. "This is the perfect place to promote SeeAndAvoid.org to the civilian aviator and increase our relations with the Experimental Aircraft Association and the Aircraft Owners and Pilots Association, as we work together to prevent future close calls and accidents," said Lt Col Linch.

According to See-And-Avoid's web site, since 1978, there have been an average of 30 midair collisions in the United States each year. These collisions resulted in an average of 75 deaths per year. There are also more than 450 near-midair collisions reported each year. "It's the responsibility of all pilots to see and avoid each other as we share the skies safely," said Lt Col Linch. "Over time, I expect to continue improving with new innovative technologies to increase awareness and help decrease the dreaded close encounter."

http://www.af.mil/news/story.asp?storyID=123061687


Not to be confused with Bird and wildlife Aircraft Strike Hazard...
BASH
BIRDS ADAPT SO HEED
Adapt...they do!

Photo by Jim Gordon

"ATC Will Clear us... Not A Problem"

CAPT JARED YAMASHIRO
38 RS
Offutt AFB, NE

USAF Photo by:
TSgt Paul R. Carson, Jr.

It was going to be a beautiful day to fly. Here I was, at Kadena AB, on the island of Okinawa, and I'm about to fly on my first operational mission as an aircraft commander of the RC-135 Rivet Joint. I was excited and anxious to get this one "under my belt," since this was a culmination of all the hard work I put in, to get myself in this position -- to be in charge of my own crew and aircraft, doing a "real" mission versus all the training I had accomplished in the past.

We show up to the squadron, and everything goes as smoothly as I could've ever wanted. The weather looks beautiful for our entire flight. The crew seems enthused about the mission. We get all the details about the mission during our step brief, and everything looks good. The preflight and engine start fly by, and I'm thinking to myself, "This sortie is going so well…almost too easy." Well, then of course, Murphy strikes and starts to make my day much more complicated. We delay on the ground for several hours for our tanker. They decide they can't support us and cancel. We then get words from our ops and are told to figure out the maximum fuel load we can take off with, and get as much of the mission done as we can.

At this point, my copilot and I look at our Takeoff and Landing Data (TOLD), and realize we can take another 30,000 pounds worth of fuel. We also realize that we are taking off with the heaviest jet either of us has had, and that our performance margin, although safe and legal, doesn't give us the normal "pad" we have experienced in the past.

It also just so happens to be a day that my copilot is scheduled to do the takeoff, and as we take the runway, everything goes as planned. We lift off and, as the pilot not flying, I put the gear up and supervise the takeoff. I also quickly glance at our Traffic Alert and Collision Avoidance System (TCAS) display and notice another aircraft around 300 feet above us and 15 miles at our 1 o'clock position. The copilot now starts to fly the published departure procedure and as we climb past around 1,500 ft, I hear that an All Nippon Airlines (ANA) aircraft get cleared from their present altitude to flight level 250. I don't think anything of this at the time, as I am monitoring the copilot to make sure he flies the aircraft within the aircraft's operating tolerances (remember we're a very heavy aircraft with reduced performance margins?).

As we continue on with the departure, I start the "after takeoff-climb" checklist and try to accomplish the items by alternatively completing a single checklist item, then scanning our instruments to make sure the aircraft is flying and climbing properly. ATC then clears us to flight level 260, and I notice on the TCAS display, an aircraft that is now around 10 miles away and around 500 feet above us. I think to myself, "Is this the same aircraft that I saw on takeoff? Is this the ANA airplane that I had heard on the radios earlier?" I now start to get concerned about this other aircraft, but at the same time I think, "ATC will clear us from each other, it's not going to be a problem." I should be more concerned with our aircraft and ensure we continue to fly this very heavy aircraft within its performance margins.

Now this is the point in the story where things get interesting. We get a call from ATC that we are cleared from our present position to a latter point in our flight plan. Almost immediately after I repeat this clearance, a different voice comes on the radio and says, "Negative, continue on the departure procedure." I repeat this clearance again and notice that on our TCAS display that same aircraft has now become a Traffic Advisory (TA) on our TCAS system. This alert basically means that TCAS considers the traffic to be a potential hazard, that we don't need to initiate evasive maneuvers, that we just need to use increase vigilance in monitoring the other aircraft. I now try to find the aircraft visually using the TCAS display to get a bearing and distance of the traffic, and then use this information to cue my eyes outside of the aircraft. Looking back, I have no idea how long all of these events are taking place; all I know is that it seems to happen in rapid succession. The navigator on my crew is now leaning over from his seat and is scanning outside, looking for this other traffic over my right shoulder.

Almost simultaneously, the navigator and I see the traffic just above our altitude, becoming larger and larger in the same spot in our windshield. This is not good. Also at this time, the TCAS system now calls a Resolution Advisory (RA) of the other aircraft. This means the system has now projected the traffic to be a collision threat. The TCAS system will generate a command now to either climb or descend, to ensure we have safe vertical separation from the threat traffic, and we're now obligated to follow those commands as long as it doesn't put our aircraft in a more dangerous situation (i.e., if we were to have been close to the ground or ocean, and it gives us a command to descend).

Since the threat traffic is above us, the TCAS system commands us to descend, directing us to do a greater than 1,500 feet-per-minute descent in order to avoid this traffic. The copilot pushes over on the yoke with, I will admit now, some help from me to get the aircraft in a descent. We then achieve about a 2,000 feet-per-minute descent and avoid the other traffic. We lose about 500 feet in altitude and descend from approximately 5,000 feet to 4,500 feet. After all of this happens, we continue on our way and finish the rest of our mission without any significant incidents.

Now, as a new aircraft commander, there were several lessons learned for me from this incident. First off, no matter how many different factors are going on in the flight (first AC operational sortie, tanker delay and cancellation, heavy weight takeoff, running a checklist), the principle rule from all my training and flying still applies…fly the aircraft. We flew the aircraft and maintained our situational awareness the best that we could, given the circumstances.

Another lessoned learned for me was about Crew Resource Management (CRM). CRM at times gets lip service in the flying community, that it's some class that we're required to take on a periodic basis. Well, for me now, CRM means keeping my copilot, navigator, and crew well informed on what's going on and the decisions that I'm making as an AC. In this instance, the navigator and I had the most SA on this traffic, and we communicated in the cockpit to the copilot to ensure he had an idea of what was happening with this traffic, how we were closing on it, when the time came to avoid the traffic, and what we needed to do, given the TCAS system commands. This leads me to the last lesson learned. Whether it's TCAS or any other system on the aircraft that assists us in avoiding potentially dangerous situations, these systems are only as good as the operator who uses and understands the system. In this case, our TCAS system functioned properly and was instrumental in allowing us to maintain SA and help avoid a potentially midair collision between two large aircraft. It's a system that we understood and followed, and allowed us to enjoy this particular beautiful day to fly.

Preventing Runway Incursions

ANONYMOUS

A ***runway incursion*** is "any occurrence in the airport runway environment involving an aircraft, vehicle, person, or object on the ground that creates a collision hazard or results in a loss of required separation with an aircraft taking off, intending to take off, landing, or intending to land."

Runway incursions are a major aviation safety issue, with the number of incursions increasing. In fact, the worst aviation disaster in history (the collision between two Boeing 747s at Tenerife, Canary Islands) was a runway incursion. Complex runway and taxiway layouts, large numbers of aircraft, controlled take-off times, weather, time of day, taxiway and runway closures, airfield construction, and inadequate airfield diagrams are all challenges that must be managed so that runway incursions can be avoided.

There are several sources of information on runway incursions and ground operations. FAA advisory circular AC 120-74A deals solely with flight crew procedures during taxiway operations. This circular is intended for use by aircraft with two or more crew members on the flight deck. Much of the guidance in AC 120-74A will be in your AFI 11-2MDS Volume 3. Although AC 120-74A is primarily for crew aircraft, several of the procedures and techniques advanced by the circular pertain to all aircraft. FAA AC 91-73 has information about single pilot procedures during taxi.

The following discussion on runway incursions is aimed at operations at unfamiliar airfields and may not be as pertinent to pilots whose mission primarily transits familiar airfields with American controllers.

The FAA has produced a paper that they refer to as "10 Ways to Help Prevent Runway Incursions."[1] I've listed their 10 ways below (in italics) and took the liberty of adding my two cents. In addition, I have added a few ways (11–16) to help prevent incursions that I feel are worth mentioning. I have seen my share of mistakes during ground operations, and I hope that I can help others avoid those same mistakes.

The FAA's ten ways to help prevent runway incursions:

1. *See the "Big Picture." Monitor both ground and tower communications when possible.*

Of course the objective here is to improve your situational awareness by knowing what other aircraft are doing and the instructions they are receiving. Although monitoring two frequencies to get the "big picture" may be possible at a smaller field with limited ops, keeping track of the "big picture" at a large international airport may not only prove to be very difficult, but may be counterproductive. In fact, aircrews should limit tasks to only those that are essential during taxi operations. Don't let your quest to see the "big picture" become a distraction.

2. *Transmit Clearly. Make your instructions complete and easy to understand.*

Pilots must know and use standard phraseology. Using non-standard radio "jargon" is both frustrating (to those that have to deal with it) and dangerous, especially internationally! For instance, ICAO phraseology dictates that the only time a pilot uses the phrase "takeoff" is when they are reading back a take-off clearance. Transmitting, "Reach 123 is ready for takeoff" in an ICAO envirnment is not

USAF Photo

procedurally correct. Remember that many foreign controllers have a limited English vocabulary and they expect to hear standard radio phraseology. Jargon that a Delta Airlines pilot might use with Atlanta Center will simply cause confusion outside of US airspace (and occasionally outside of Atlanta Center!). Finally, read back all clearances and hold short instructions and always include the runway designator (as required by procedure).

3. *Listen Carefully. Listen to your clearance. Listen to what you read back. Do not let communications become automatic.*

Listen carefully to your clearance with your headset on. Insure the other pilot also is on headset to receive the clearance. If you and the other pilot don't hear the exact same clearance, clear up any ambiguity with clearance delivery. Utilize other competent crew members to back up ground operations. If you have a pilot in the jump seat, put him to work!

4. *Copy Clearances. Clearances can change. Keep a note pad and copy your clearance. If needed, refer to your notes.*

If you haven't been writing down clearances and you are still flying, you are better than me! One technique I use is to type the taxi instructions into the FMC scratchpad. Again, ensure you and the other pilot agree on the clearance you received.

5. *Situational Awareness. Know your location. If unfamiliar with an airport, keep a current airport diagram available for easy reference.*

It is critical to print out airfield diagrams for all destinations and alternate airfields with which you are not familiar. Unfortunately, a large portion of airfields in DoD FLIP do not have adequate airfield diagrams. Usually all one has to work with is the small diagram in the bottom right corner of the approach plate. These diagrams with no taxiway markings are unsuitable for maintaining situational awareness. Jeppesen usually has very complete airfield diagrams for nearly all locations they cover. Additionally, Jeppesen products frequently have runway incursion "hot spots" annotated on the airfield diagram. These "hot spots" are areas identified as being particularly conducive to runway incursions. If no airfield diagram is available, occasionally the DAO or your MAJCOM TERPS shop can help procure an airfield diagram. Google Earth and Google Map often provide useful imagery for airfields although taxiway names are not given. On the airfield, using the aircraft compass as a back-up is an excellent SA tool.

6. *Admit When Lost. If you get lost on an airport, ask ATC for help. Better to damage your pride than your airplane.*

A delicate ego and aviation don't mix. Even if only one crew member is lost or unsure of the aircraft's location, the airplane needs to be stopped until everyone on the flight deck is positive of the aircraft's location. DO NOT stop on a runway. If possible, taxi off the runway and then initiate communication with ATC to regain orientation.[2]

7. *Sterile Cockpit. Maintain a sterile cockpit until reaching cruising altitude. Explain to your passengers that talking should be kept to a minimum.*

Sterile cockpit means only matters pertinent to the operation of the aircraft are discussed. Discussions about plans for the evening or your favorite movie

are violations of sterile cockpit concept. While sterile cockpit is required up to 10,000 feet, in my experience, this rule needs constant reinforcement. During ground ops, the sterile cockpit concept is critical and must be adhered to.

8. *Understand Signs and Markings. Keep current with airport signs, lights, and markings. Know what they mean and what action to take.*

Many airports around the world have inadequate signs and markings, and some signs and markings are improperly placed and used inappropriately. As always, if in doubt, query the controller. Also remember that the most dangerous time on the airfield is during low visibility ops, especially when ATC personnel cannot see the position of aircraft on the airfield. Ensure that you are proficient in Surface Movement Guidance and Control System (SMGCS) procedures before you operate in a SMGCS environment (RVR less than 1200'). For more info on SMGCS, see FAA Circular AC 120-57.

9. *Never Assume. Don't take clearances for granted. Look both ways before entering or crossing taxiways and runways.*

Controllers are human and they make mistakes. Apply common sense to all clearances and again, if in doubt, ask! AC 120-74A cautions that a potential pitfall of pre-taxi and pre-landing planning is setting expectations and then receiving different instructions from ATC. Flight crews need to follow the given clearance or instructions that are actually received, and not the ones the crew anticipated.

10. *Follow Procedures. Establish safe procedures for airport operations, then follow them.*

Although procedures are developed at the MAJCOM level, if you see a procedure that is unsafe, talk to your flight safety officer and have your concern addressed at the appropriate level. Standard operating procedures (SOPs) should minimize flight crew workload while the aircraft is in motion. Ensure aviators you fly with adhere to established procedures.

11. Pre-mission Planning. Although a little out of order, I feel that planning is the single most valuable safety tool we have. Pre-mission planning should include items such as a the crew's familiarity with the airfield, NOTAMS, parking location, taxiway widths, taxiway and ramp weight bearing capacity, special or unique intersections, airport "hot spots" (see 5 above), taxi length, and forecast visibility.

12. If told to taxi into position and hold and are not advised of an expected delay (such as "Expect delay for wake turbulence"), remain aware of the time you have waited on the runway. FAA analysis of accidents and incidents involving aircraft holding in position indicated that two minutes or more elapsed between the time the instruction was issued to "position and hold" and the resulting event (e.g. landing or go-around)[2].

13. After landing and exiting the runway, nonessential communication and nonessential flight crew actions should not be initiated until clear of all runways, in accordance with sterile cockpit procedures. This is also true of running checklists after landing, but before you are 1–00% sure of your location and your taxi route. Too many times I see a copilot furiously doing a post landing procedure when they aren't sure of their exact position on the field or taxi route to park.

14. After landing, inform Ground Control specifically where you are. "Reach 123 is clear of the active" is awfully vague if you're at an airport with three or four active runways.

15. When holding in position at night, consider lining up slightly left or right of center line to enable a landing aircraft to visually differentiate your aircraft from runway lights.

16. Exterior lights can inform you of other pilots' intentions. Although not usually practiced by military pilots, civilian pilots often operate aircraft lights to make operations on the airfield more conspicuous as described in AC 120-74A. As AC 120-74A says, "Pilots may use various combinations of external lights to convey their location and intent to other pilots, ATC, and ground personnel. Because adherence to these (AC 120-74A) guidelines is voluntary and aircraft equipment varies, flight crews are cautioned not to rely solely on the status of an aircrew's lights to determine the intentions of a flight crew of the other aircraft."

Examples of exterior light uses are:

Engines running: Rotating-Beacon - ON.

Taxiing: Nav, position, anti-collision and logo lights (if available) - ON.

Aircraft giving way to other aircraft or stopping: Taxi light is turned off.

Crossing a runway: All exterior lights–ON. (Crews should be considerate of the effect of their aircraft lights on other pilots' vision.)

Entering the departure runway (position and hold): turn on all lights that highlight the aircraft (except landing lights).

Takeoff: When cleared takeoff, turn on landing lights when take-off clearance is received or when commencing take-off roll at an airport without an operational control tower. The SOP of turning on landing lights when take-off clearance is received, is to signal other pilots, ATC, and ground personnel that the aircraft is moving down the runway for takeoff.

Although these guidelines don't cover all situations and eventualities, utilizing proper pre-mission planning, adherence to procedure, and knowledge of common pitfalls can help us all avoid one of the dangers of aviation: runway incursions.

www.faa.gov/runwaysafety
USDOT FAA AC 120-74A

A BASH Success Story

MAJ BRAD GILLETTE
80 FTW
Sheppard AFB, TX

USAF Photo by Capt Chris Lovegren

Bird and wildlife strikes are a hazard for every type of aircraft in all environments. This is one threat that cannot be totally eliminated, but with proper planning and implementation, a good BASH plan can greatly reduce this threat and make a safer flying environment.

Sheppard AFB, TX averaged 73 birdstrikes per year from FY 1999 to 2004, with FY 2003 through FY 2004 averaging 85 birdstrikes per year. These alarming statistics led Sheppard to make some big changes in its BASH program in attempts to reverse this costly and potentially life-threatening trend.

In August 2004, Sheppard hired a US Department of Agriculture (USDA) wildlife biologist to assist with its BASH program on and off base, and ultimately reduce the number of bird and wildlife strikes that were occurring on the airfield. The plan developed by the Flight Safety office with the help of the wildlife biologist, was straight forward. If the number of birds on or around the airfield can be reduced, the number of birdstrikes (at least on the airfield) should decrease as well. In order to reduce the number of birds on and around the airfield, the first step was to identify which types of birds had the largest presence on base and which type was involved in the majority of aircraft birdstrikes. Once this was determined, methods to mitigate the birdstrike risk from these identified species could be developed.

Photos Courtesy of Author / Photo Illustration by Dan Harman

Meadowlark nest before grass cut to 5" height

The 80 FTW Flight Safety office and Mr Ted Pepps, Sheppard's USDA wildlife biologist, took a look at which birds attributed to the majority of birdstrikes on the airfield. In FY 2005, 23% of all the birdstrikes on the airfield were identified as Eastern Meadowlarks. In FY 2006, this number increased to 28% of identified bird species. Eastern Meadowlarks accounted for $588,000 in aircraft damage from FY 2004 through FY 2006. Armed with this data, the safety office looked into ways to reduce the Eastern Meadowlark population on Sheppard AFB. With the help of the USDA wildlife biologist, it was discovered that the ideal grass heights for the meadowlarks to build their nests was 10 to 20 inches with the tops of their covered nests being 6 to 7 inches off the ground in the grass. AFI 91-202 directs grass heights on airfields to be 7 to 14 inches. The 80 FTW Safety office requested a waiver to maintain grass heights at 5 to 12 inches during the meadowlark nesting and breeding season of March through June. Cutting the grass to 5 inches cuts off the tops of the meadowlark's nests leaving them exposed and causing the birds to abandon their nests and seek shelter elsewhere. This shorter grass height is also a less attractive nesting habitat for the meadowlarks, causing them to nest elsewhere. The Air Force Safety Center approved the grass height waiver to maintain the airfield grass heights between 5 and 12 inches. Sheppard started maintaining this new grass height in March 2007 and as of the end of May 2007, there has been only one identified meadowlark birdstrike out of 27 total birdstrikes, with no damage to the aircraft.

Meadowlark nest after cutting grass to 5" height

Another major concern on base was the Great-tail grackles and European starlings. In FY 2005, there were approximately 55,000 grackles and starlings congregating on and around Sheppard. These numbers were highest around sunrise and sunset. Sheppard's USDA wildlife biologist developed an aggressive plan to disperse and depredate these blackbirds in order to reduce their numbers. Depredation and dispersal activities were carried out in FY 2005 through FY 2006. During this time period, over 34,000 blackbirds and starlings were depredated and over 8,500 were harassed in attempts to have them leave the airfield area. Because of these efforts, the blackbird and starling numbers have decreased dramatically to 15,000 in January 2007. A few weeks later, the grackle and starling numbers were reduced to almost nothing on Sheppard AFB.

Grackles flying near the dorms at Sheppard AFB

Airfield topography was evaluated by the wildlife biologist in an effort to reduce areas on the airfield that were conducive to increased bird activity. Besides monitoring grass heights throughout the airfield, the USDA wildlife biologist identified areas of bare ground and areas of standing water, which also attract birds and other wildlife. Work orders were submitted to civil engineering to rectify these problem areas. A major drainage project is still ongoing at Sheppard AFB, in an attempt to reduce standing throughout the airfield and reduce potentially attractive bird and wildlife congregation areas.

As well as recommending topography changes to the airfield, Mr Pepps maintains a daily presence on the airfield, controlling or capturing wildlife before they become a hazard to flight operations. The fence lines around the airfield were found to have gaps in the bottom, with enough room for coyotes and jack rabbits to enter the airfield. Until these gaps in the fences were corrected, Mr Pepps remained busy removing wildlife on the airfield. Fifty-five coyotes, seventy-one jack rabbits, eleven deer and eleven cows were removed from the airfield over FY 2005 and FY 2006.

In order to maintain the required grass heights, the grass mowing on the airfield cause smaller birds, mammals, and insects to disperse into the open. These smaller birds, mammals, and insects attract larger soaring birds which feed on these displaced animals and insects. In the spring and summer months, soaring bird activity increases as Turkey vultures, Red-tailed hawks and Swainson's hawks migrate into the area in search of food. In terms of damage costs per 100,000 flying hours, these birds rank 4th, 6th, and 25th respectively among USAF birdstrikes. Mr Pepps has been able to remove or harass over 32 vultures and 103 Red-tailed and Swainson's hawks. Some of these birds have been marked, relocated to areas away from the airfield, and released back into the wild.

BASH awareness among the 80 FTW has increased in part due to recommendations made by the USDA wildlife biologist. As he identifies increases to migration over and around the airfield, this information is rapidly disseminated to the flying squadrons. Updates are posted on video displays in the hallways, where people can see this information as they walk by. The information is also e-mailed to the squadron flight safety officers for dissemination. While this may not directly prevent a birdstrike, it does make the pilots more aware that the threat has increased, and they are more prepared to handle a birdstrike if it happens. Three or four times from April to October, the migration routes, altitudes, and times of bird migration updates are sent to the flying squadrons.

Red-tailed hawk captured on the airfield at Sheppard AFB

Since the USDA wildlife biologist has been working at Sheppard AFB, birdstrike and wildlife strikes have decreased every year. Birdstrike rates at Sheppard per 100,000 flying hours from FY 2004 to FY 2006 have decreased from 1.06 to 0.77, respectively. Damage costs have also decreased from $350,090 in FY 2004 to $232,231 in FY 2006. A more telling statistic for the improvements that have occurred since FY 2004 is the birdstrikes that occur on the airfield. The percentages of birdstrikes that have occurred on the airfield have dropped from 80% in FY 2004 to 43% in FY 2006. As of May 2007, airfield birdstrikes have accounted for only 30% of all birdstrikes on Sheppard AFB aircraft. Many factors can be associated with the vast improvement of bird and wildlife strikes at Sheppard since FY 2004. Most of the BASH improvements can be associated to the direct involvement of Mr Pepps, the USDA wildlife biologist at Sheppard. The cost of having a USDA biologist at Sheppard AFB has been more than justified with the decreased wildlife strikes and decreased damage costs to USAF assets, not to mention the potential lives saved. It only takes one birdstrike to cause a loss of an aircraft or even worse, a loss of life. In FY 2006, one birdstrike event caused a T-38 to abort a takeoff and engage a BAK-15 barrier, causing $187,000 in damage to the aircraft. This one mishap accounted for 80% of the damage costs for FY 2006. If we can prevent one less birdstrike every year, we may be able to avoid that "golden BB" that brings an aircraft down or causes a loss of life.

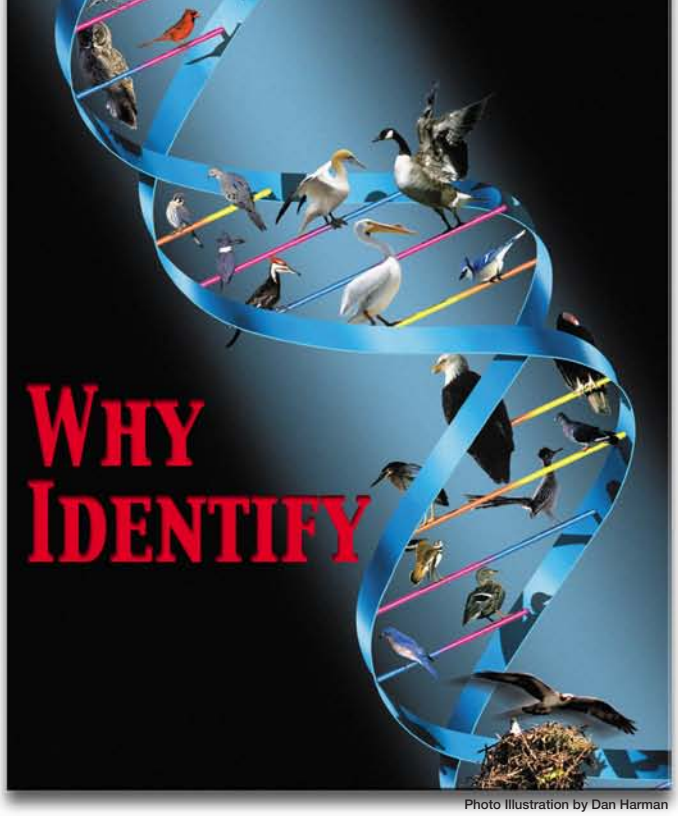


Photo Illustration by Dan Harman

CARLA J. DOVE AND MARCY HEACKER
Smithsonian Institution
National Museum of Natural History
Feather Identification Lab, Washington, DC

For those of us who have been in the field of Bird Aircraft Strike Hazard (BASH) Safety for many years, the reasons to identify the exact bird species from birdstrike events are obvious. However, newcomers to the field often don't see the big picture when it comes to bird identification. One of the most common questions from new BASH officers is, "Why are remains collection and identification required by Air Force Instruction?"

The Smithsonian Institution has been identifying birds from feather fragments and gooey 'snarge' for more than 40 years now. Knowing what birds are causing problems is the first step in realizing what can be done to discourage bird use of airfields, plan aircraft flight paths and flying times, and reduce the chances of birds and aircraft colliding.

Species identifications have helped provide baseline data needed to properly implement habitat management plans on airfields, warn aircrews of birdstrike dangers, and assist engineers in designing safer aircraft and more robust engines.

Retrieving as much information as possible from every strike provides crucial information to those who support flight operations. A few examples include:

- Bird weight data obtained from species identifications was used to improve the design of the T-38 Talon and F-16 Fighting Falcon aircraft windscreens.

USAF Photos / Photo Illustration by Dan Harman

• Legal issues, ranging from permit hearings on landfills, wetland expansion, and concerns of wildlife officials who protect endangered bird species, often rely on the species-specific information from birdstrike data to support mission-related and land use decisions around our military airfields.

• Species identification data was vital to the development of the US Air Force Bird Avoidance Model (BAM) and Avian Hazard Advisory System (AHAS), allowing aircrew to predict the dangers of birdstrikes before flying.

• Species data is necessary in many countries for airports to obtain permits to remove hazardous birds from airport environments.

• The US Air Force used species identification data when deciding whether or not to change military fleets at McChord Air Force Base, Washington. A change in aircraft at the base would have resulted in more low-level flying, and wildlife officials were concerned this would have had a negative impact on resident and migratory Bald Eagles and Peregrine Falcons. By using species identification data from birdstrikes, enough statistical information was available to verify that these species are rarely involved in birdstrikes, and the flight training at McChord continued.

• A recent crash of a US Air Force aircraft was initially blamed on Snow Geese (3 kg birds). However, once feather material and DNA analysis was conducted, the culprit turned out to be a Mallard Duck (1 kg), resulting in different management strategy recommendations.

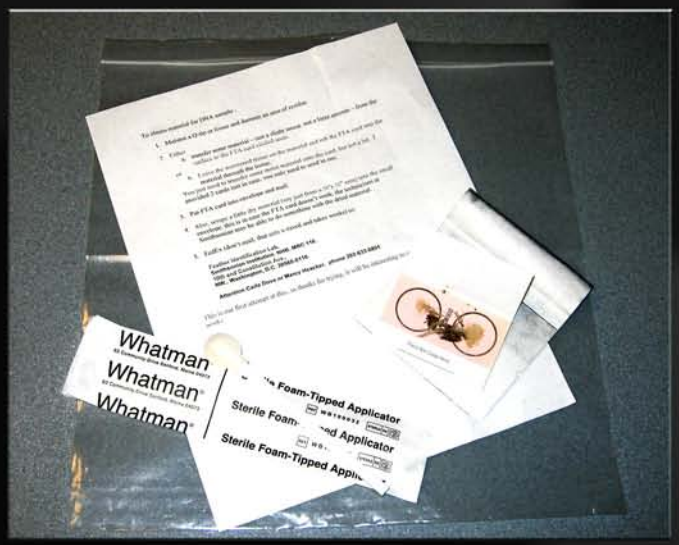
Some frequently asked questions addressed by the Feather Identification Lab are highlighted below with brief answers:

1.How do I report birdstrikes?

• All classifications of wildlife strikes are reported via the Air Force Safety Automated System (AFSAS) by an authorized AFSAS account holder. Accounts may be requested through your MAJCOM BASH representative. An Air Force Form 853 may be used to help preserve data relevant to the strike. This form can be found at http://www.e-publishing.af.mil/.

2.What kind of material is needed to identify birdstrikes?

• Always consult local safe handling guidelines before cleaning any aircraft surface. Feathers, beak, talons, blood, tissue, or any other minute evidence left on the aircraft or found after the birdstrike, may be used for identification. The more evidence we have, the better and faster we can conduct the identifications.



• ***Blood or tissue*** evidence should be collected using 70% ethanol by first spraying the strike area before blotting off the remains with a paper towel or cotton swab, or wiping the area with an alcohol-based towel. The alcohol helps preserve DNA better than water. Do not use bleach, formalin, or cleansing solutions to remove smears as it may damage DNA. Water is no longer acceptable for blood and tissue samples, because it does not inhibit mold growth which is problematic for DNA sampling. Over 77% of the samples with mold do not yield viable DNA for species identifications. Bottom line, all samples should be dried completely before placing in zipper-lock bags.

• A DNA fixing card (FTA – see photo) was tested by our lab in cooperation with Whiteman Air Force Base for blood and tissue samples. We found that 87.5% of the blood and 'snarge' samples received using these cards produced species level identifications from very minute samples. The FTA cards are only for blood and/or tissue samples and do not work for whole feathers or feather fragments. The special fixing chemical in the card stops DNA degradation on-the-spot. To use FTA cards, the sample is swiped with an applicator or sterile swab and immediately transferred to the card. Alternatively, the card can be pressed directly on the sample. After the card is air dried, it is placed in a zipper-lock bag and shipped for identification. These cards cost about $1/each and can be obtained from scientific supply companies.

• ***Whole feathers or dried material*** should be collected by scraping and removing all material that is available. If the whole bird carcass is available, remove feathers from the breast, back, wing, and tail and store in a zipper lock bag for shipping. Pull, do not cut, feathers from the bird's body, because we also rely on the fluffy part of the feather for microscopic examination. Allow all material to completely dry before shipping.

3.How do I ship feather remains?

• Place feather or blood remains in a zipper lock bag labeled with the corresponding AFSAS identification number and ship to the Feather Identification Lab as soon as possible. The Feather Identification Lab accepts remains from all foreign countries provided the remains were properly treated and correct paperwork accompanies the shipment. For all foreign shipments you must include:

- Certificates of Origin
- Certificate of Treatment
- Smithsonian's APHIS permit

Examples of the required paperwork can be found on the AF BASH Team's website: http://afsafety.af.mil/SEF/Bash/SEFW_new.shtml.

Shipping addresses may be found at: http://afsafety.af.mil/SEF/Bash/SEFW_wild.shtml.

Consult the Feather Identification Lab for instructions if any questions arise.

4.What human health precautions should I take when collecting bird remains?

• Although the transfer of avian disease to humans is extremely rare, the recent concerns over avian influenza (H5N1) and the global spread of disease alerts us to take care when collecting and handling bird remains. It is always a good idea to follow the safe handling precautions established by each organization. Wearing gloves and practicing common-sense hygiene such as thoroughly washing hands with soap and water and the use hand sanitizers is recommended. Each wildlife strike event should be reviewed before proceeding with remains collection. Additional information can be found on the AF BASH Team's website: http://afsafety.af.mil/SEF/Bash/SEFW_new.shtml.

More information can be obtained by sending a message to:

Carla Dove–dovec@si.edu
Marcy Heacker–heackerm@si.edu
Nancy Rotzel–rotzeln@si.edu

... or by referring to the USAF BASH Team's webpage: http://afsafety.af.mil/SEF/Bash/SEFW_home.shtml.

Remembering that the database is only as good as the data and that every birdstrike sample provides clues to birdstrike avoidance is paramount to good flight safety!

FY07 Aircraft Flight Mishaps
(Oct 06 - 7 Sep 07)

21 Class A Aircraft Flight Mishaps
2 Fatalities
13 Aircraft Destroyed

FY06 Aircraft Flight Mishaps
(Oct 06 - 7 Sep 06)

17 Class "A" Aircraft Flight Mishaps
1 Fatality
7 Aircraft Destroyed

Flight Rate Producing

02 Oct	C-21A	✈	Hard landing, a/c departed runway, burned
02 Oct	F-15E		Multiple bird strikes, damage #2 engine/left wing root
26 Oct	F-16C	✈	A/B takeoff, engine fire, successful takeoff abort
04 Dec	F-16D	✈	Engine IFE during range ride
26 Dec	C-5B		Bird Strikes on local training flight, engine/airframe damage
18 Jan	T-38C	✈	Engine failure during low level, bird strike
19 Jan	F-16C	✈	Engine failure on training mission
31 Jan	C-17A		#3 engine thrust loss, engine damaged
22 Feb	T-38C	✈	Aircraft crashed on training mission
12 Mar	F-16D	✈	Aircraft crashed into water on training mission
12 Mar	F-16C	✈	Aircraft crashed short of runway
21 Mar	F-15E		Bird strike to #1 engine
16 May	U-2S		Hatch separated and struck aircraft
30 May	F-15D	✈	Aircraft crashed on training flight
11 Jun	F-15C	✈	Midair collision, F-15 crashed / F-16 landed
15 Jun	F-16C	✈	Aircraft crashed shortly after T/O, pilot killed
26 Jun	F-15A	✈	Aircraft crashed into water on training mission, pilot killed
15 Jul	F-16CJ	✈	Aircraft departed RWY on T/O

UAS

17 Jan	MQ-1B	✈	Loss of eng power, non-permissible area, CFIT
23 Feb	MQ-1B	✈	Propulsion system failure, high terrain impact
26 Mar	MQ-1B		Crashed on landing

- A Class "A" aircraft mishap is defined as one where there is loss of life, injury resulting in permanen total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 Million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects all fatalities associated with USAF Aviation category mishaps.
- "✈" Denotes a destroyed aircraft.
- Air Force safety statistics may be viewed at the following web address:http://afsafety.af.mil/stats/f_stats.asp
- **If a mishap is not a destroyed aircraft or fatality, it is only listed after the investigation has been finalized. (As of 10 September 07).**

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AVIATION

The Aviation Well Done Award is presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

SSGT JEFFREY OSWOOD
20 SOS
Hurlburt Field, FL

The Aviation Safety Well Done Award is presented to Staff Sergeant Jeffrey Oswood, 20th Special Operations Squadron, Hurlburt Field, Florida in recognition of his exceptional contributions to aviation safety. On 2 September 2006, during a Direct Action Infiltration of US/Iraqi Special Operations Forces to an unsecured helicopter landing zone, Sergeant Oswood identified a potentially catastrophic aircraft system failure. The cadence of the crew was interrupted halfway down the approach when the roaring sound of uncontained bleed air erupted from the cargo area of the helicopter. Upon landing, Sergeant Oswood quickly inspected the affected area and advised the pilot that the risks associated with remaining in the unsecured landing zone outweighed relocating the malfunctioning aircraft to a secure airfield. Once repositioned to a secure forward operating base, Sergeant Oswood determined the hot air coming from the broken bleed air line could start an electrical fire due to the close proximity of electrical lines. He recommended shutting engines down in order to repair the line to a flyable condition. Using only equipment available in the onboard toolkit, and relying on his prior maintenance experience, Sergeant Oswood repaired the line for a one-time return flight to Balad Air Base. Sergeant Oswood's knowledge, experience, and ingenuity allowed for the safe return of 22 American and Iraqi military members and a multi-million asset. Sergeant Oswood's superior airmanship and ability to perform under extreme circumstances reflect great credit upon himself and the United States Air Force.


Coming in October 07
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