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BASH

BIRD / WILDLIFE AIRCRAFT STRIKE HAZARDS

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contents

4 **Bird Detection Radar Development…**
From Dare County to the Cape

7 **Mobile GIS And Flight Safety**
Successfully weaving the three steps of BASH

10 **Feathers, Beaks, Feet, And…"Snarge?"**
Collecting remains

12 **BASH: Lots Of Technology Vs. A Little ORM**
Implementing real-time risk assessments

14 **Captain M. The Quite Different FOD Story...**
A mouse in the helmet

16 **Safety Poster**
BASH, if you can't beat them...

18 **Wiley And The Jet**
The 4-legged animal

20 **"Birds!"**
A flock of seagulls

22 **Low-altitude Training And Bash**
Optimizing our skills to get "low"

24 **BASH Avoidance**
Which bird, if any?

26 **Never Say Never… Oops, I Just Did!**
The "go-around" call

30 **Class A Flight Mishap Summary**

31 **Aviation Well Done Award**
Maj William Denehan

Cover: USAF Photo
Rear Cover: USAF Photo by SrA James Harper
Photo Illustration by Dan Harman

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Things That Go "Bump" In The Flight

The articles in this year's BASH edition highlight new tools and programs, operational procedures, and risk management techniques currently under development, as well as those employed to mitigate potential hazards. You'll find BASH "war stories," highlighting the need to remain vigilant. Each of the articles should serve as a reminder to prepare for what could later go "bump" in the flight.

Test questions: (1) Why does the Air Force gather BASH statistics? (2) Why should they be noteworthy to you? Answer: Accurately reporting and identifying what wildlife our aircraft strike, and where and when the strikes occur, enables the USAF BASH Team to specifically research, develop, and enhance programs. These actions allow us to effectively and efficiently target and mitigate the hazard.

Strike risk decreases as altitude increases, with two notable exceptions. One spike occurs between 500 and 700 feet—range and low-level operational altitudes. The other spike occurs between 1,000 and 3,000 feet—pattern altitudes for most bases. Mission and training requirements direct us to fly at these altitudes for prolonged periods.

Hitting birds of any size, while traveling low and fast, can cause extensive damage. Hitting birds while flying slowly around the flagpole usually doesn't cause as much damage. Did you know that 49 percent of our bird strikes occur on or around airfields, accounting for 33 percent of total damage? Did you know that only 14 percent of recorded strikes occur during low-level and range operations, but account for 62 percent of total damage?

Here are more statistics: Horned Larks top the strike-count list, with more than 3,000 recorded strikes in 20 years. All those strikes only account for little more than $2.5 million in damage. Turkey Vultures, on the other hand, rank eighth-highest on the strike-count list, with more than 500 struck. They rank second on the damage list, causing more than $98 million in damage. Number one on the damage-cost list—White Pelicans. Eight known pelicans have been struck over the years, causing a staggering $257 million in damage.

The USAF BASH Team

Bird Detection Radar Development ...From Dare County To The Cape!

T. ADAM KELLY
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LT COL TED WILKENS
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Photo Illustration by Dan Harman

Only 14 percent of bird strikes to our aircraft occur during low-level and range operations. That number isn't really that small when one considers this 14 percent accounts for 62 percent of total damage costs! In the spirit of mishap prevention, developing technology to increase aircrew safety and reduce damage is one of the USAF BASH Team's primary missions. Correctly identifying hazards allows us to properly target the correct species with an appropriate tool while prudently spending diminishing government funds.

The United States Air Force made its first steps into using small mobile radar to detect and count birds at Dare County Bombing Range, NC, in the summer of 1993. Dare County Bombing Range is operated by the 4th Fighter Wing at Seymour Johnson AFB. The range is a large expanse of Pocosin Wetlands, bounded on the north by the Albemarle Sound, on the east by the Croatan and Pamlico Sounds, and on the west by the Alligator River. The peninsula is separated from the Atlantic Ocean by the Outer Banks, a string of narrow barrier islands. A section of mainland Dare County near the range was donated to the U.S. Fish and Wildlife Service in the 1970s to protect unique regional peat lands, establishing the Alligator River National Wildlife Refuge. By 1993, the Alligator River Refuge started to wrap around the Dare County Bombing Range, and the USAF BASH Team needed a way to quantify and manage year-round the risk that vultures and wintering/migrating waterfowl presented to aircraft using range airspace.

A decision was made to use modified marine radars to detect and quantify bird activity at Dare County Range, and to use the data to populate a Bird Avoidance Model (BAM). In 1994, antennas were changed, scan patterns modified, and a video recording system was added to the radar. These adjustments saved countless man-hours of video ground truthing (verification) counts, size approximation, altitude, and flight direction of airborne targets.

Many lessons were learned during this pilot project. For example, bird detection with a 3 cm X-band in the horizontal plane was significantly less than a 10 cm radar. In addition, birds could not be easily detected when it rained and the display became saturated. However, we did learn that birds do frequently fly in the rain. Birds were observed flying directly into and disappearing inside a region of rain using a conical scanning radar. Perhaps the biggest find was detecting a large movement of 30,000-40,000 20-pound-plus Tundra Swans as they passed directly over the range each fall at altitudes from 500-3,500 feet! This migration primarily occurred at night, unseen by range staff or pilots flying on the range. The project proved that commercial off-the-shelf radar equipment could be used to detect and quantify bird strike hazards to aircraft and find previously undetected bird hazards that existed before we lost an aircraft.

With completion of the Dare County BAM in 1995, the radar equipment was relocated to Moody AFB in south central Georgia. Instead of manually typing records of bird activity to the computer database, the system had evolved to a more automated bar code entry process. Hundreds of hours of video review were still required but unique insights into bird biology were gained daily.

Photo Courtesy of Authors

While the equipment was being reassembled at Moody AFB, the project staff developed a plan over lunch to spin a marine radar in the vertical plane like a windmill instead of the more typical horizontal plane used on a boat. Biology researchers at the University of California also had the same idea. Vertical scanning is now the mainstay of bird radar studies in recent years. Vertical scanning offers the ability to look at both the approach and departure corridors, and above a single runway to see all the birds moving in that area. This is a key piece of small mobile radar technology. Data derived from Dare County and Moody AFB became the foundation of what is now the Avian Hazard Advisory System.

A problem still hindered researchers: Marine radar could see thousands of bird targets an hour, far beyond human limits to record all that activity manually. Several attempts were made to create an interface between the radar and a computer, starting with video feed and image processing to capture target information. Later, a radar computer interface card was used to take raw radar signals and bypass the radars' electronics, completing more sophisticated signal processing inside a high-end computer workstation. Success! Days of counting targets were finally over, and bird detectability on radar was significantly enhanced. Further breakthroughs revealed that applying the correct signal processing algorithms to horizontal S-band radar data would detect birds in both rain and snow. Applying clutter mapping techniques allowed birds to be seen over areas with moderate ground clutter. Unmodified off-the-shelf marine radars cannot detect birds within ground clutter or rain.

The advent of automated software to track, quantify, and display bird and aircraft activity opened up another opportunity…a radar could be used to see and avoid birds in real time rather than taking all the data to produce a model for forecasts. The first airfield to employ this technology for real-time air traffic control was RAF Kinloss, Scotland, in 2002. Large flocks of geese transit that airfield twice daily during winter months, creating a severe flight hazard, particularly after sunset as the geese return to their roosts. A British Aerospace Nimrod MR1 maritime surveillance aircraft crashed at RAF Kinloss in November 1980, killing two crewmembers as a result of such a collision to combat the bird strike danger. A bird detection radar was installed at RAF Kinloss.

Within a year of radar employment at RAF Kinloss, the first USAF bird detection radar was installed at Dare County Range. The vertical scanning radar informs range controllers of bird altitudes, enabling aircrews to decide what delivery routines can be performed while maintaining vertical separation from bird activity. Range officers and 4th FW aircrew members developed procedures to pass bird activity information and blend risk management decisions into range operations.

Range officers were quick to see an additional benefit. It was very accurate at depicting bird activity relative to aircraft, but it could also detect civil aircraft taking unannounced shortcuts through range airspace. DeTect designers wondered how else their radar could be used to improve flight safety.

This year, DeTect, Inc. will provide a mobile radar not just for bird strike prevention, but also

to maintain safe separation between UAVs and manned aircraft. UAV operators have data links with GPS coordinates informing them where other aircraft are located. This new radar will have multiple roles. The first signal processor will be set to minimize weather, enabling greater aircraft detection and providing safe separation. A second parallel signal processor will do the exact opposite and be optimized for hazardous weather detection. The weather radar display will also include real-time lightning strike monitoring.

But of all the aviation safety-related bird radar projects to date, the most ambitious is potential strike detection and notification during a space shuttle launch. A Turkey Vulture, estimated at nearly five pounds, struck the STS-114 mission shuttle on takeoff from Kennedy Space Center on Jul. 26, 2005. Two other vultures were noted extremely close to the shuttle as it climbed away from the launch pad. They succumbed to the eventual flame plume from the rocket boosters.

Turkey Vultures frequently strike USAF aircraft, causing serious damage. They are the only species to have the dubious distinction of appearing on both "Top 10 Strike Lists" compiled by the USAF BASH Team using over 20 years of strike data forwarded from the field. Turkey Vultures rank eighth for strikes by count, with 519, and second for strikes by cost, with over $98 million in damage.

The STS-114 strike was the first known bird strike to a space vehicle. With a Turkey Vulture's average weight on the East Coast being around five pounds, a strike at a critical point on the shuttle could be catastrophic. The foam chunk that fatefully struck Columbia's wing in 2003 was estimated to weigh only 1.7 pounds. This bird strike event was taken very seriously by NASA following the damage to and subsequent loss of Columbia.

A couple of challenges to operating radars around rockets had to be overcome. Rocket fuel requires careful management of exposure to radiofrequency (RF) energy. 30-60 Kw marine radars typically used for bird detection was out of the question…too powerful. The other challenge was the ground clutter generated by the shuttle itself and the large steel gantry from which it was launched.

DeTect staff were given the opportunity to show NASA what they could do with just weeks left to the launch of mission STS-115. Selecting a lower power radar and using the vertical scanning technique perfected over years of development, DeTect staffers successfully detected vultures over a power station building that offered a similar radar cross-section to that of the shuttle launch pad.

With vulture detection successfully demonstrated at the range, as required by NASA, the last challenge was to build additional safeguards into the radar system. One such safeguard prevented accidental RF radiation of facilities where shuttles are assembled and rocket fuel stored. NASA required electronic redundancy to ensure the radar emitted only in approved directions. DeTect also built a second passive system using radar-absorbing material to provide redundancy. The system was tested on the empty 39A pad with two weeks to launch. When RF levels were acceptable, the radar was pointed toward the shuttle Discovery parked on launch pad 39B. The vulture population enormity sank in. More than 300 vultures call Kennedy Space Center home, and they were spending hours at a time soaring directly over the launch pad.

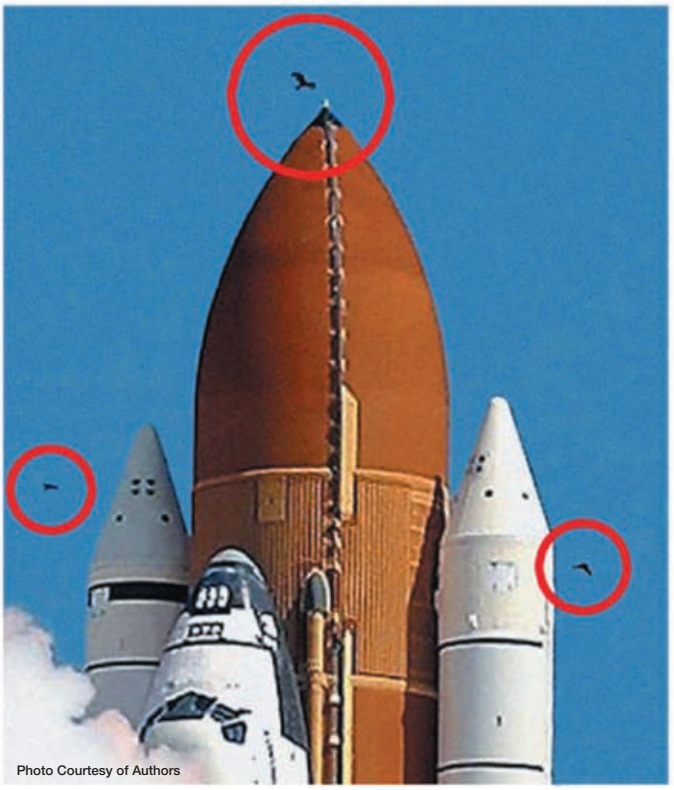
Photo Courtesy of Authors

On 4 Jul 06, after two scrubbed attempts for weather, DeTect staffers watched radar displays from the Launch Control Center. NASA personnel watched similar displays in the Fire Control Room. Three Turkey Vultures briefly soared over the launch pad just five minutes before launch but moved away from the area leaving a clear path for an uneventful and successful Discovery launch sequence. NASA ensured a strike-free shuttle launch.

Launching a shuttle is very similar to launching an aircraft. The only difference is the shuttle climbs straight up rather than gradually down a runway. The same tools can be used to see if the path is clear or obstructed by birds.

Today, bird detection radars are operating at Dallas-Fort Worth International Airport and Louisville International Airport. Bird detection radars will be operating at several Air Force bases by the end of this year. This technology has proven viable for military, civil, UAV, and space operations.

MOBILE GIS AND FLIGHT SAFETY

LT COL TED WILKENS
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USAF Photo by Mickey Sandborn
Photo Illustration by Dan Harman

Normally, three steps are involved when confronted with Bird/wildlife Aircraft Strike Hazards (BASH): awareness, hazard identification, and threat mitigation. While all three areas are necessary for successful resolution to your BASH issue, properly identifying the threat is perhaps the most important one. The USAF BASH Team is committed to fully exploiting existing technologies and seeking new ones to assist you in maximizing all three steps. Use of Geospatial Information Systems (GIS) weaves aspects of all three steps into one product.

The Air Force Safety Center maintains over 20 years of wildlife/aircraft strike data. This data is input by and collected from you: maintainers, operators, airfield controllers, civil engineering, etc. Statistics show BASH events cost the Air Force an average of $35 million a year, excluding any loss of life. Just over 5,000 strikes were reported last year alone. If you break the data down further, 49 percent of those strikes occurred around the airfield and caused 33 percent of the total damage costs.

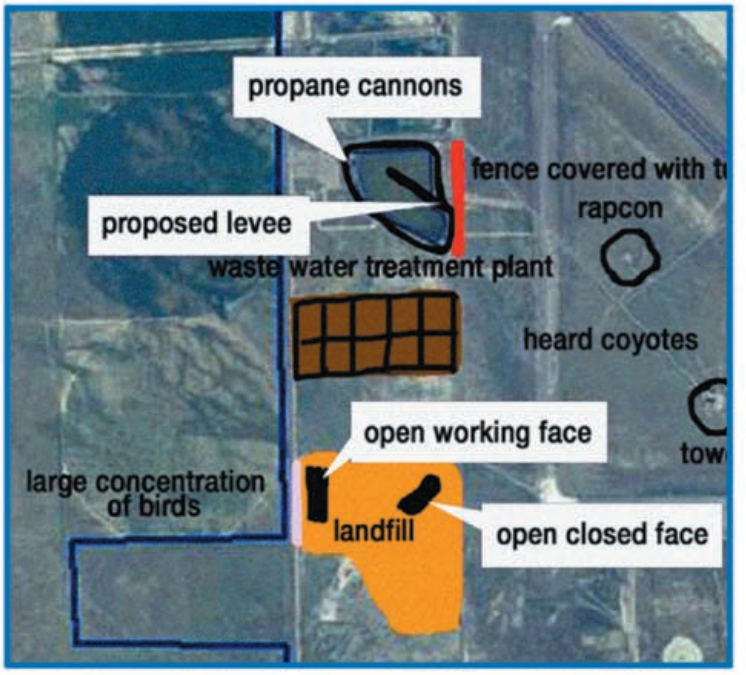
We have the ability to control what transpires on the airfield by properly managing the environment around the aircraft movement area. Personnel who deal with the airfield have an enormous impact on flight safety by the way they manage habitat. This is where the use of GIS data really begins to reveal its potential. Accurately identifying problems focuses awareness so BASH-tasked personnel may better manage their time and effort on the airfield. In addition, accurate hazard identification enables proper resources to be applied to correct the situation the first time with minimal costs in a time of dwindling funds.

The Air Force determined a few years ago that mapping technologies were not adequately being coordinated within the service. Different functional communities within a single wing were duplicating mapping efforts to visualize their individual needs. Money and other precious resources were being inadvertently squandered. As a result, the USAF established the GeoBase program to provide a single mapping framework that could be used

by all Air Force users. GeoBase provides a combination of people and technologies to manage the mapping needs Air Force-wide.

As with any other information technology, training is required to navigate GeoBase applications. It can be frustrating to those who "recreationally" use it. Extensive knowledge of data layers and merging imagery with that data is needed. Luckily, all active duty Air Force installations have an assigned GIS point of contact. These POCs are usually embedded within civil engineering as the Geospatial Integration Office (GIO) and are there to promote and further its use as the single mapping framework. They are there to help users, and they enjoy doing it! Most major AFRC and ANG installations have an assigned GIO. Smaller units that do not have an assigned GIO can request assistance from larger units within their assigned region.

The BASH Team conceptualized development



Imagery Courtesy of Authors

of GIS modeling to enhance BASH reduction initiatives when conducting unit Staff Assistance Visits (SAV). Since mobility is paramount for field work, a tablet laptop computer with ESRI ArcGIS software was acquired. Total cost was around $6,000, with a majority going toward software licensing fees. Prior to conducting a SAV, preparation includes downloading satellite imagery, downloading existing data layers, and formatting both for use on the computer. Imagery and other data can be retrieved from MAJCOM or installation GIOs and other federal, state and local agencies. Keep in mind, imagery is only as accurate as what is available; most areas are mapped every few years. Also, most metropolitan areas and major installations usually have crisp resolution to one foot, but clarity can vary greatly by region.

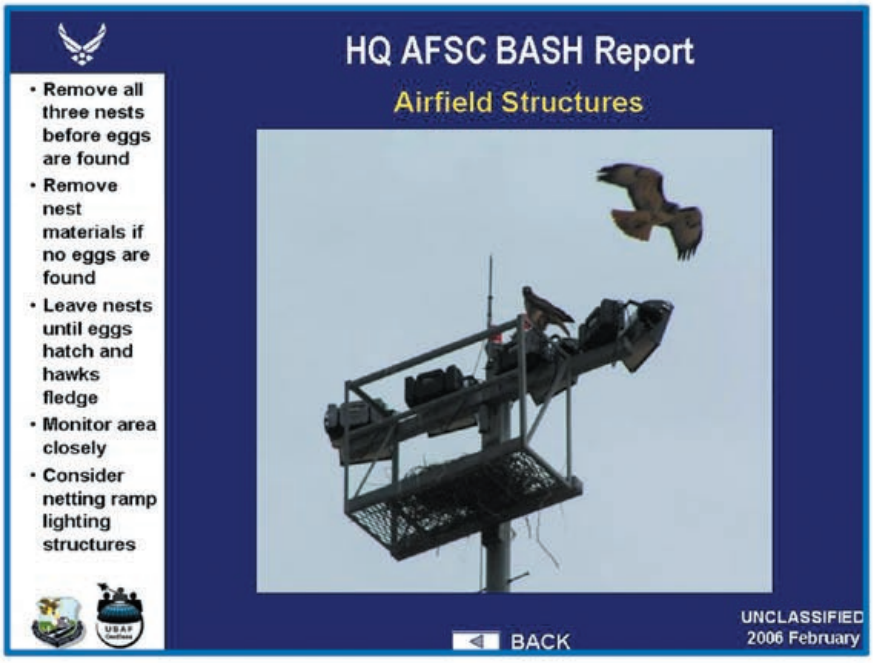
Data layers are fundamental to how GeoBase works. Downloaded satellite imagery from whatever source provides the core data layer for visual presentation and reference. Other data that might be needed for a BASH visit can include areas of endangered fauna and flora, landfill locations, property boundaries with owner details, land uses, and buildings with descriptions. This standardized data is managed by each base and can be requested through the local GIO. The BASH Team is in the process of identifying the data needed to support the BASH mission, termed the BASH Mission Dataset. This BASH Mission Dataset will be deployed across the Air Force within the next few years. The amount of data and detail available is astounding.

Armed with a tablet PC loaded with imagery merged with data layers, the Bash Team can tour an airfield noting hazards and recommendations right on the screen as they are discussed. These "notes" are added into the data layers when saved. Pictures can be taken during the airfield tour and added into the appropriate data layers at a later time to highlight the noted hazard and recommendation. Using this equipment and software in the field is relatively easy and requires only minimal training.

enduring knowledge when personnel transfer positions.

ACC, AMC, and USAFE currently have GeoBase data available through the AF Portal. We are working with the different GeoBase offices to provide an efficient means for viewing SAV-related information. Community of Practice (COP) sites are also becoming popular and an effective way to do business. We are exploring ways of populating data onto viewing platforms within COPs to ease access for those who need it. The venerable trip report is not going away quite yet; a formal report is still issued for official record keeping.

Information that is stored in data layers is not stagnant. It can be changed by the local GIO whenever an enabled user wants to change it.



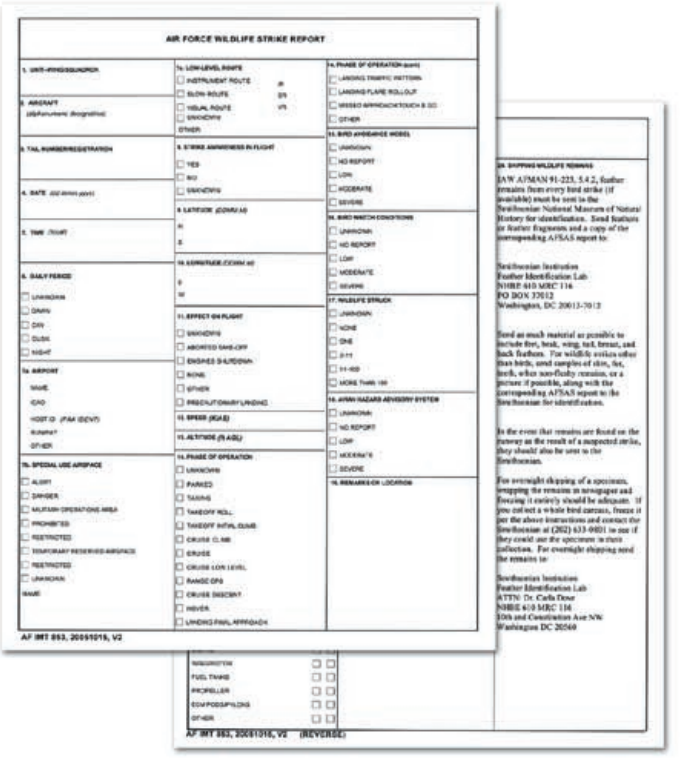
The BASH Team is addressing SAV information distribution issues, specifically how we get this information out to all users so they can make smart decisions. Formal written trip reports with findings and recommendations have been issued for years. Not everyone received the information who needed it, though. Our initial end goal in GeoBase was to get SAV information out to all interested parties in a product that everyone could access. We crawled before we walked. Not everyone had the capacity, knowledge or interest to access GeoBase when it was first deployed in the field.

Initially, after data was collected from the field in the tablet computer and downloaded and formatted into data layers, it was forwarded to the home unit's GIO for addition to their existing data layers. The BASH Team would then create a user-friendly interactive Power Point display that could be presented to different agencies around the base. We are working on placing the data on the AF Portal that will be accessible through a user-friendly format. Level layer security will be implemented to ensure only those with a need to know and who are granted permission will be able to access the information. Member organizations of the Bird Hazard Working Group, for example, should have access. Power Point shows are still created for presenting a portable method of offering findings and recommendations and raising awareness, but the Portal provides

If a recommendation is followed and the hazard is eliminated, that layer can be hidden from view and stored as historical data. It is important not to delete any previously identified hazard in case it reappears somewhere else on the airfield; it will continue to exist as a virtual memory.

Using GeoBase for BASH empowers people to visualize potential wildlife hazards on the airfield through proper identification and corrective recommendations in one program. GeoBase ensures data will be accessible for multi-agency cross-flow and action. Data stored provides a historical record of past deficiencies and solutions. GeoBase…it is one map for one installation.

Photo Courtesy of the Smithsonian Institute Division of Birds



MAJ DAN WILSON
16 SOW
Hurlburt Field FL

OK, before we get started, I need to warn you that this may get just a little bit graphic. We're going to discuss mangling birds and other wildlife with our aircraft or other means, then we're going to talk about picking up the little bloody pieces of meat, feathers and other unidentifiable bits. We might even sponge some of the bloody mess off our aircraft and keep it for future use. So, continue at your own peril…

You're still here. Good, because this is actually important stuff. All of those AF Form 853s (Air Force Wildlife Strike Report) that we fill out, along with all of those animal parts we collect, really do go to the Smithsonian Institution in Washington, D.C., and they really do get identified by experts in Forensic Ornithology. The Air Force uses this data in habitat management around our airfields and for building the bird avoidance models (BAM) used for planning low-level routes and such. Additionally, all of this information is also useful for designing more bird-resistant engines and windscreens.

You're asking, how you can help? Well, after your aircraft experiences a bird strike (or deer strike, or whatever), hopefully you are OK and are safely on the ground. After that, there are a few things you need to do. In order of importance, these are:

1. Fill out the Form 853.
2. Collect animal remains.
3. Take photos of the places on the aircraft that were struck.

Form 853

The Form 853 is not only a good idea—it's the law. Although it mainly pertains to birds, you have to fill it out if you hit any type of wildlife, regardless of damage to the aircraft. It's easy to fill out, so take an extra minute and be sure it's accurate. Details like time and location are very important in building the BAM we mentioned earlier. Yes, I know...I hate paperwork, too, but you're still better off than the bird.

Collection

Next comes the least popular part—specimen collection. Let's go over a few rules of thumb:

First, bigger is better. The experts at the Smithsonian can identify a species of bird from the tiniest bits of feather, but why make it difficult for them? If possible, take the entire bird carcass and freeze it inside a Ziploc® bag. Then wrap it all in newspaper and/or pack it with dry ice before mailing. The Smithsonian has already said they will accept all packages, even if they are leaking or smelly.

If sending the whole bird isn't possible or practical, get as much bird as you can. Beaks, feet, wings, etc., are all useful for identification. If possible, send whole bird pieces, as opposed to plucking feathers—this retains the fine structures in the fluffy part of the feather. For the same reason, never cut feathers off the bird. Again, Ziploc® bags are handy here.

If there is nothing left of the unfortunate avian except a smear of blood, don't give up yet! This mix of blood, microscopic feathers, and who-

Photo Courtesy of the Smithsonian Institute Division of Birds

USAF Photo by SrA James Harper

knows-what-else, is called "snarge" by the bird strike experts. First, pick out any visible feathers in the mess—tweezers are useful for this chore. Then, lightly spray the spot with water if it needs to be moistened, and then blot with a paper towel or cloth. Then, put feathers, cloth, snarge, and all in a Ziploc® bag for submission to the Smithsonian. The tiny feathers will be cleaned and then examined underneath a microscope, and can often be sufficient for making a positive ID. Additionally, the Smithsonian is building a DNA database that allows recognition from the smallest blood or tissue samples.

When shipping all of these bits and pieces, please don't use tape or Post-It® notes around the specimens. These things tend to stick to the feathers and damage them, making identification harder.

If you hit something besides a bird, it probably does not need to go to the Smithsonian. But, if you hit something and aren't sure what it is, contact them via the phone number on the back of the Form 853, and they can most likely arrange to receive samples or photos for creature ID.

A final note on collecting: Don't be limited to sending remains found around aircraft. Wildlife carcasses discovered on or near a runway need to be collected and reported via the Form 853—the form has provisions for "Remains found on runway, aircraft struck unknown." But don't stop there! Many Air Force bases practice depredation (i.e. wildlife control by lethal means). Any depredation program should absolutely be sending samples of any species killed to the Smithsonian, along with data such as location taken from, time of day, and other pertinent details. These are especially valuable, since the Smithsonian is always looking for more specimens to fill out their collection and make species identification easier.

Photos

You've heard it so often: A picture is worth a thousand words. Although not a requirement for BASH reporting, the Air Force Safety Center (AFSC) is always looking for recent bird strike photos, both for clarification of the incident and for future education and prevention. These can be sent via mail using the instructions on the back of the Form 853, or digital photos can be sent via e-mail along with an electronic copy of the form.

Sending It All Out

OK, now you've got a properly filled-out AF Form 853, a bag of animal parts, and a few photos. Where does it go? Well, procedures vary from base to base, but usually all of the materials and paperwork go to the safety office for the flying wing at the base. They will take the data and electronically send it to the Smithsonian and AFSC. Animal parts will be sent off, as will any photos. And that's it! See, that wasn't so hard.

In closing, it doesn't take much time to report a bird strike, and it takes hardly any longer to do it right. Even though over 3,000 bird strikes are reported each year, only about a third have associated feather evidence. Remember, the BASH program exists for YOU—don't short yourself.

BASH:

LOTS OF TECHNOLOGY VS. A LITTLE ORM

CAPT BEN HESLIN
333 FS
Seymour Johnson AFB NC

Photo Illustration by Dan Harman

There I was, leading a student sortie on a low-altitude 2v2 intercept ride in the F-15E FTU Basic Course. We were established in the low-altitude MOA flying the briefed profile at 500 feet AGL. We completed one intercept with nothing significant to report. On the following intercept, one of the Red Air saw some birds and called out their approximate location. I didn't think much of it, since the location was well south of where we would be flying during this exercise. Also, I had checked the AHAS status before the brief, before stepping to the jets, and in the hour of our operations in the low-altitude MOA as required by our local regulation, and the bird status was low; nothing to worry about.

Thirty seconds later my jet passed under about 10 large soaring birds just a few hundred feet above us. Close enough for me to see some detail on the birds, and close enough for the birds to feel sufficiently threatened that they dove through my altitude. Luckily, we received no damage but why were they here? It was bird low. And more importantly, what do I do next—complete the sortie or climb up to avoid the risks? I had taken all the correct and required steps, but the steps required by BASH did not translate to what I experienced in the airspace.

BASH is another one of the things you have to do before you fly. Depending on your location, you have to check the airfield bird status, the low-level bird status, or the range bird status. It is another step in the seemingly never-ending pile of paperwork necessary to fly. Because of this, BASH is often seen as another regulation or training rule that keeps a flight from completing all of the necessary training; whether it is multiple patterns, formation takeoffs or landings, or air-to-ground range and low-level work. This attitude makes most aircrew overlook the fact that the BASH program has been a great success.

However, simply following all of the advanced technology and modeling does not remove aircrew responsibility for implementing real-time risk assessment using ORM. No matter how many radars or how many models of bird activity are used, they should be viewed as a starting point in the process of risk assessment for a flight.

So, now I need to figure out if it's worth continuing a syllabus sortie in the low-altitude environment when I know there are at least two areas where birds have been spotted. The training is important, but *how* important is it? I used AHAS to assess my risk before takeoff, but now my risk level seems to have changed airborne. In a few seconds of thought it is possible to run through the steps of ORM and make an efficient decision. The truth is that aircrew often go through the ORM matrix without even thinking about it. Below is my thought process and how I decided to continue or abort a mission based on low-altitude bird status in a low-altitude MOA or MTR (military training route).

1. Identify the Hazards:

This is pretty obvious. Birds are the hazard.

2. Assess the Risks:

My perception of risk is slightly different because our base lost a jet to a bird strike several years ago. I know the survivors of this crash, and they are very aware of birds flying in the vicinity of their airspace and are well aware of the possible catastrophic risks of a bird strike. . Based on the ORM assessment, the probability of bird strike runs throughout the envelope from likely to unlikely, with severity from negligible to catastrophic.

3. Analyze Risk Control Measures:

Before I took off I had some knowledge of what to expect from the hazards in the area. I also assessed the risks even before starting mission planning. AHAS said the bird status was low, so we assessed the risk and continued to the airspace since the risk was acceptable at that level. We planned for minimum risk and incorporated the appropriate safety devices required by the procedures and our training. However, now it is time to make a decision real-time in the air.

4. Make Control Decisions:

This is why aircrew upgrade to flight leads, instructors, evaluators, and supervisors. The decisions made at this point come with the responsibility of those positions. As an instructor and the flight lead of the sortie, I had to make a decision. In my mind, one sighting of a bird is not a big deal. As long as I see one and it passes under the jet, I am happy to press forward with the sortie. However, when I see a second and possibly a third, I see that as an increase in risk level. To me moving forward at low altitude would be accepting a known unnecessary risk. It is just not worth it. No flight or syllabus ride is important enough to even bring about the thought of losing an aircraft to ensure completion.

I also use the size of the birds to assess my risk level. Large groups of soaring birds, especially those above my altitude, constitute a great deal of risk to aircraft operating in the low-altitude environment for an extended period of time.

5. Implement Risk Controls:

Again, this is easy; just climb away from the ground and terminate the low-altitude maneuvering. Set a new floor and continue, or switch to an alternate mission. I decided to climb up above 3,000 feet AGL because bird strikes decrease significantly above that altitude.

6. Supervise and Review:

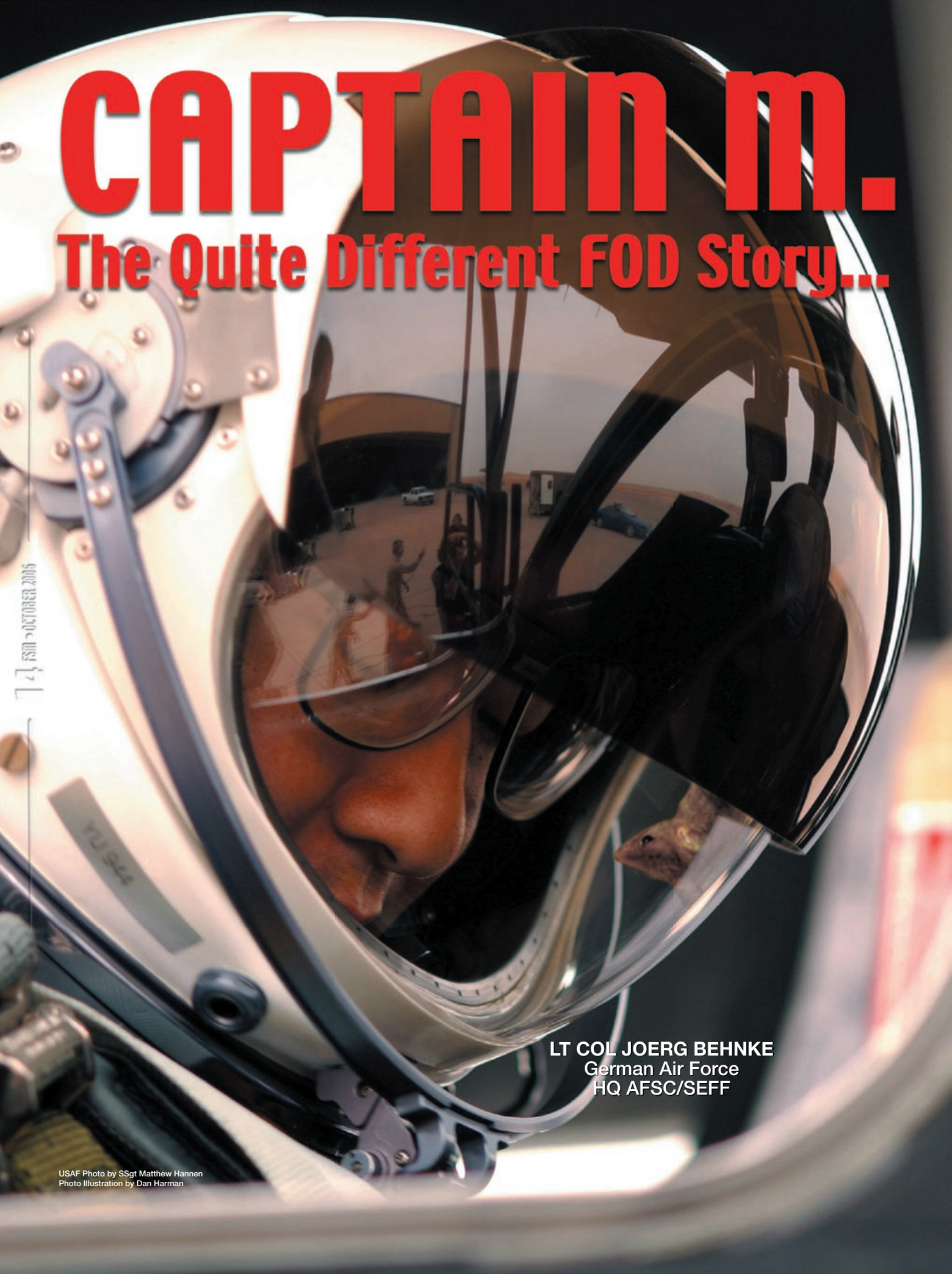
Since the implementation was done at the formation level, I simply told the supervisor after landing of my decision and debriefed my decision with the flight.

The BASH program is a wonderfully successful program. However, the tools only go so far to mitigate the risk of bird strikes. Using ORM is common sense for most aircrew. Simply look at the risk and your comfort level in the low-altitude environment and assess if it's worth being in that regime of flight. Is it worth losing an airplane to a bird strike during a training sortie? Never. Is it worth a higher bird strike risk on a combat operation? Maybe. Therefore, aircrew need to be able to assess real-time the data they are seeing with their eyeballs to mitigate the risk and severity of bird strikes. A little ORM, common sense, and a few seconds of thought can go a long way to save years of second-guessing.

CAPTAIN M.

The Quite Different FOD Story...

LT COL JOERG BEHNKE
German Air Force
HQ AFSC/SEFF



USAF Photo by SSgt Matthew Hannen
Photo Illustration by Dan Harman

First of all, this is a kind of a "There I was" story out of the middle '80s, and it is a story from the other side of the Iron Curtain. Although it doesn't deal with a personal story of my own flying experiences, it is really funny, it is worth speaking about and it contains some "lessons learned" for anybody. Also, of course, be sure that this story has passed the 10%-rule, because it really happened. *It is true.*

Although the happening didn't qualify as a Class C, E or whatever kind of mishap, it could have easily become one. It also was never given any kind of report, but honestly speaking, it never *needed* an official report because this story ran quicker through the Air Force than any mishap report ever had done.

It happened on a hot summer day somewhere in East Germany. A wing exercise had been ongoing for a couple of days and almost everybody was exhausted at that stage. So, it was not usual to take a short "combat" nap in the "battle" breaks, if the alert status allowed it. And so Captain M., as we will call him, did just that.

He was one of the squadron pilots who were scheduled to fly an intercept mission in the stratosphere on this day. That's why he was wearing a special flight suit, and had a special helmet lying beside him in the grass. All that special flight gear is required to give the pilot a chance to survive a rapid decompression in altitudes above 50,000 feet. Everybody who has seen a fully equipped U-2 pilot knows what I'm talking about here.

But on this day, Capt. M. was in a deep sleep behind his Aircraft Shelter as the next scramble alerted him. He woke up, grabbed his helmet and jumped into his cockpit. Starting the engine, checking the systems, taxiing to the runway, takeoff; he did all this as quickly as he could. He was on schedule, and felt in very good shape. The weather was also pretty good and all the aircraft systems were working very well; nothing could be going wrong.

Yes, it could!

At first it was only a short impression; not much more than an illusion. But it came again and again. Then it was like a shadow, moving from left to right and vice versa. Sometimes it was almost a black line, in connection with a gentle touch on his face. He wanted to scratch his skin, because it was tickling, but due to the closed helmet that was impossible. For a while he thought about possible reasons. Sometimes it felt like a drop of sweat was running down his nose; it was comparable to that. But what about the black shadows?

Capt. M. was trying to find an answer to his question, when suddenly he focused on a thing which was less than an inch from his eyes.

The thing, he discovered, was a mouse. Yes, there was a *mouse*. Immediately, he closed his mouth, with all his nightmares coming true. This damned mouse was flying with him. It was flying with him *inside* his helmet, and there was no way to catch it. He knew that at once.

Meanwhile, the Ground Control Intercept controller was monitoring the flight path of Captain M.'s aircraft as he got a radio call. He was trying to understand it, but he couldn't. It was something like "I have a ..ous.. in the ..." but no more. So he asked him to say the last transmission again. But again, there was no way to discover what the pilot wanted to inform him about. And so, getting a little nervous, he had to call him again, to ask him to repeat his call. Now there came the transmission, crystal-clear, loud and very, very quick.

"I have a mouse in my helmet!"

This was enough to create, in a split-second, a picture of the situation in the cockpit, or better yet in the pilot's helmet. Needless to say, that was also the last call of Capt. M. He aborted the mission immediately, flew back to the base without any radio call, and landed the aircraft very quickly. As soon as he left the runway, he jumped out of the cockpit, pulled off the damned helmet and threw it away.

After all the funny stuff around that story there is of course also something we should think about: Taking care of your flight gear isn't the whole story. Everybody who is familiar with the situation in a cockpit can imagine how critical this situation was, and how it could have deteriorated. But the pilot kept this aircraft in controlled flight. That's the point. Don't think too long about a problem, if there's something you need to concentrate on—like flying the aircraft. Maintain control of the essentials, especially of the aircraft. A proper action could also be, to say nothing; to avoid any radio call. That means, take your time, and think about the basics. Concentrate on the main thing—survival.

Don't get concerned with minor problems. And a mouse is a tiny one. But sometimes it could also create you a new nickname, like "Captain Mouse."

BASH

BIRD / WILDLIFE AIRCRAFT STRIKE HAZARDS

If you can't beat them...

USAF photo by MSgt Lance Cheung

Wiley...

CAPT CHRISTOPHER JACKSON
391 FS
Mountain Home AFB ID

*(Editor's Note: We present this to show that birds are not the only hazard out there, and to remind you that BASH actually stands for "Bird/*Wildlife *Aircraft Strike Hazard.")*

It was a dark, cold Wednesday night, and I was on my way out of the squadron. I had been looking forward to a night of relaxation after a full day of flying and debriefing.

All of a sudden, a voice from the ops desk said, "Jackson, you are full-up on the safety brick, right?" It was the squadron flight safety officer (FSO).

I answered, "Pretty much." I had done all of the interviews and briefs, and had attended the ACC program manager's safety course at Dyess AFB. However, I had never been out on my own, let alone at night!

I got a quick night orientation from one of the former safety guys, and I was off on my own. The previously scheduled safety officer got thrown into a last-minute flight, and there I was. What could possibly happen with only three hours left in the flying hour window? Immediately after all the safety guys had left, the safety brick started to blast with communications from crash net (a system of phones to alert all the necessary emergency, command, and control agencies should an in-flight emergency arise) that I'd never heard before.

I thought, "You should call the SOF (supervisor of flying) and see what is up." Upon talking with the SOF in the tower, I learned that an F-15C had hit a coyote on takeoff roll. All kinds of worst-case thoughts raced around my cranium—mainly those associated with a coyote carcass destroying an engine or landing gear. I asked if he had any other information. The SOF said the jet was airborne, dumping fuel and getting a night vision goggle battle damage check. I was also informed that Base Operations was checking out the runway for FOD (foreign object debris) from the coyote or the jet.

I jumped in the safety wagon, threw on the yellow

Photo Courtesy of Author

And The Jet

USAF Photo / Photo Illustration by Dan Harman

roof light, and was off to respond to my first in-flight emergency (IFE)! Base ops were on scene and had already closed part of the runway. They were searching the field for airplane and canine parts. Base ops also took some photos of what they found. Quite impressive to see how an F-15C at 130 knots can rip the back end right off an apparently solid coyote. I got a look at all of the coyote remains, but then it was time for the F-15C to come back to land after adjusting its gross weight.

I lined up the safety wagon with the emergency response vehicles. The safety vehicle is equipped with all the necessary radios and gear needed to document any major emergency response. I found myself feeling important all of a sudden. In a fighter squadron with over 25 lieutenants, it is fairly easy to consider yourself just one of the lowly snack officers (SNACKOs), even if you are a fighter pilot. However, now was my big chance—I was acting as the Fighter Wing Commander's representative that night!

The jet landed uneventfully, and while that isn't the most exciting thing to read, it was great since I could now relax a bit. The fire chief and his rescue crews gave a good look at the jet and terminated the emergency. It was all pretty interesting and exciting, even after witnessing IFEs from the inside of the cockpit. Aside from driving over a red line (fortunately a maintenance troop was the only witness), and parking incorrectly when I had returned to the F-15C model ramp, the emergency response seemed to go well.

Now I had to begin the safety part of the investigation to determine what damage, if any, had occurred. I talked to the pilot, whom I had known from my days at a small engineering school in Colorado Springs. He said he had seen an animal break across the runway as he was near rotation speed in his airplane. Though he had very limited experience with air-to-ground targets (compared to a Strike Eagle pilot), he knew the coyote presented a unique and hazardous threat to his jet. His lightning-quick reactions prompted him to get his nose wheel off the ground. He judged that the four-legged animal would impact the jet at the nose gear. Surprisingly, the coyote missed the nose gear, but the pilot thought he might have clipped the mangy mongrel with another part of the jet. He notified the tower and took the appropriate actions for a flawless recovery of the aircraft.

After checking the jet over, no one could find a tuft of hair, guts, or even any blood. Because it was dark out, I requested maintenance contact safety if they ended up finding something in the morning. They never did. I gave the pilot a ride back to his maintenance debrief and had him fill out an IFE worksheet. Then, I asked him to fill out a bird strike form, since it was the closest thing I could find to a wildlife strike.

I thought my night was complete. However, out of nowhere my safety cell phone rang. It was command post and they said the Wing Commander wanted to talk to me! I thought, "Holy ---, what did I screw up?" I promptly called Gunfighter 1 and reported to him that his jet, the prized 366 FW flagship, was home safe with zero damage after the coyote strike. "Well Lieutenant, I think we got lucky this time," he said. I got a feeling of a job well done—from the Wing King himself.

There was only one thing left to do. I asked the pilot if he wanted the remains of the coyote.

"Are you serious?" he replied.

"Well, base ops doesn't know what to do with it." I said. "Maybe you can put it up in your bar as the Wild Boar's first air-to-ground kill", I said jokingly. So we picked up the Boar's new furry friend. I've been told it was gutted and stuffed for display.

Editor's Note: Although it was not a bird, the hit was correct to report a coyote strike. All wild animals struck by an aircraft are to be reported!

"Birds!"

MAJ MATTHEW BAKER
403 WG
Keesler AFB MS

USAF Photo SrA Lakisha Croley
Photo Illustration by Dan Harman

The purpose of the Air Force's safety program is to prevent mishaps based on our experiences or incidents of the past. This flight, from my personal experiences, could have very easily ended in a Class A mishap and multiple casualties. The crew performed well, but any number of factors could have produced a very different outcome.

On August 25, 2002 I was placed on the schedule to participate in an evacuation of all the C-130 aircraft from Keesler AFB. Tropical storm Isidore was bearing down on the Mississippi Gulf Coast and our wing leadership made the decision to move all the aircraft out of harm's way to Dyess AFB in Abilene, Texas.

My crew was one of the last to depart from Keesler because not only were we tasked with moving our aircraft, but we were also required to fly a weather reconnaissance mission into Tropical Storm Isidore. In addition, we also had several media personnel on board who were going to document the flight for various national broadcasting companies, plus we had another camera crew filming a television documentary on weather.

The storm was approximately 50 miles away from the coast and the weather was, as you would expect for a large tropical storm, severe. Winds gusting to 30-plus mph, combined with driving rain and low cloud ceilings, made for an interesting takeoff since our gross weight exceeded 155,000 pounds. That aircraft weight is near the upward limits for a C-130 and causes minimal climbout rates based on thrust-to-weight ratio. The runway at Keesler isn't much over 6,000 feet, which is well below our standard landing distances in the event of a

heavyweight landing. The crew discussed all these factors after the pilot's takeoff briefing on taxi-out, and we realized there was not a great deal of room for error. Even with all the morning's preparation in briefings, route study and analyzing the weather, no one on the crew was prepared for what came next.

On takeoff roll the aircraft rumbled past takeoff speed and I called "go" per our normal procedures. Immediately after the pilot rotated the aircraft, an extremely large flock of seagulls took flight on the departure end of the runway. The entire flight deck crew called out, "Birds!" and loud successive thuds pummeled the aircraft. Multiple strikes on the Hercules's nose, windows, and right wing quickly announced that we didn't miss several of the birds (29 to be exact). Number four engine instantly began to cough and engine instruments on the right side of the column all wound down. The pilot quickly reacted by feeding in rudder and attempted to continue the takeoff, but the aircraft was too heavy to maintain a normal climb profile. The engineer and I called out the extremely low airspeed and the pilot leveled off about 100 feet off the water. We caged the engine and the aircraft eventually picked up smash and began a shallow climb after cleaning up the gear.

The emergency checklist was barely completed as the loadmaster called out, "There's smoke in back of the cargo compartment!" Just as our situation seemed to settle down somewhat, we had another major problem. The pilot directed me to don my oxygen mask while he continued to fly the aircraft, not on oxygen. I came back up on headset and the loadmaster had isolated the smoke to the right rear of the aircraft, so the pilot turned off the auxiliary hydraulic pump. We got most of the smoke out of the aircraft and then focused on coming up with a game plan. Our aircraft was far too heavy with all the fuel to come back and make an immediate landing. That meant we either had to divert to another field or continue dumping fuel so we could land on the short runway back at Keesler. The pilot decided to level off the aircraft at 5,000 feet and continue our flight on an extended downwind while we coordinated our plan with air traffic control. The crew had decided the best option was to continue dumping fuel to get our landing distance down and make an immediate return to Keesler. Meanwhile, air traffic control then gave us an obscure point to navigate toward while dumping fuel. No one on the crew knew where the fuel dumping point was located that ATC referred to, so we pulled out the charts and began to search for it.

Ultimately, we reduced the fuel weight enough so we could attempt a landing back at Keesler while the navigator searched for the fuel dumping point. The wind was gusting at 30+ knots and the cloud ceilings were below 1,000 feet with driving rain. The pilot flew an excellent approach, but the aircraft actually hit two more birds in the flare, bringing the total number of seagulls struck to 31. The aircraft was safely recovered and the crew spared to a second aircraft to complete the tropical storm reconnaissance mission and evacuate another aircraft.

There were several issues I would like to review so that other aircrews can learn from our successes and not repeat our mistakes. Since we were operating so near our aircraft limitations, the thorough review of all our options prior to takeoff really aided in implementing a plan quickly. This allowed us to safely recover the aircraft prior to the storm hitting the base. The multiple emergencies took up so much of our time and effort that having a game plan in our hip pocket made the recovery dramatically easier. It also allowed us to focus on the aircraft and diagnose our mechanical problems faster.

I made the mistake of not having life support replace the communication cord to my quick-don oxygen mask prior to flight. My comm cord made an extremely loud squeal during my equipment pre-flight and I chose to leave my mask unconnected. The time that I took to connect my oxygen mask took precious seconds away from my ability to help my crew through an extremely pivotal moment after takeoff.

Secondly, the pilot did not immediately go on oxygen per our C-130 technical orders. If the fire had progressed and created more smoke and fumes, this could have deprived our crew of the most experienced and proficient pilot on the crew. It is absolutely essential for the aircraft commander to protect himself in order to safely direct the crew.

Finally, the crew became distracted with the ATC's direction to fly to an obscure point to dump fuel. Since we had already declared an emergency, we should have either told the controller where we where going to dump the fuel or asked for a vector. We should not have diverted our attention away from the multiple emergencies due to ATC interference.

Hopefully, you will never find yourself in a heavyweight thrust-deficient condition like our crew. Realize that any amount of preparation can yield great dividends in an emergency situation. Like they say, an ounce of prevention is worth a pound of cure.

Editor's Note: The AFSC BASH Team agreed with the conclusion "an ounce of prevention is worth a pound of cure," and with Maj Baker's key CRM/operational lessons learned, but said, "Nothing is better than human intervention on the airfield when mitigating wildlife hazards. Intervention by local BASH personnel on the *airfield could have potentially eliminated both sets of bird strikes in this mishap sequence*."

LOW-ALTITUDE TRAINING AND BASH

Photo Illustration by Dan Harman

CAPT MARK M. OLGUIN
334 FS
Seymour Johnson AFB NC

It's the first night of the war, the target is a heavily protected nuclear power plant, and we are going in low and fast, 500 feet AGL maximum and 540G minimum. Mission planning is complete, bombs are loaded and the jets are running. There sits Number Four, confident and ready to go! Flight Lead gives him one final check before launch and briefly thinks back to all the days and nights when Bird Aircraft Strike Hazard (BASH) kept his formation at 1500 feet AGL. Was it enough training to keep these young crews from planting it in the ground? Was there anything he could have done to better prepare his formation for tonight?

The scenario is not far-fetched; Desert Storm and Operation Iraqi Freedom verified the tactical necessity of ingressing low and fast. Those crews routinely trained at low altitude without the restrictions that BASH brings, and we still had losses due to threats. The proficiency of our crews at low altitude directly contributed to keeping our brothers safe from the highest percent kill (Pk) threat, the ground. It is with the challenges of flying at low altitude in mind that we must find smarter ways to keep our crews proficient. We can succeed by understanding how BASH works in the low-altitude arena and by optimizing our own flight leadership skills to get "low" and complete our training safely.

BASH reduction programs are developed to reduce any damage or losses of aircrew and aircraft due to collisions with birds or wildlife.

This is accomplished via identification, awareness, avoidance, control, and aircraft design. Using BASH, units have significantly decreased the number of aircrew and aircraft losses due to wildlife incursions. The program is intended to aid aircrew in conducting proper Operational Risk Management (ORM) while balancing the requirements of each mission.

Apart from picking up a shotgun and hunting alongside the USDA, aircrew can only help control wildlife strikes by knowing where the highest threats are located and avoiding those areas when possible. The Air Force Safety Center has developed tools such as the Bird Avoidance Model (BAM), Avian Hazard Advisory System (AHAS), AHAS NEXRAD database, and MERLIN Radar to aid aircrew in minimizing risk while airborne. While BAM and AHAS are intended solely for planning purposes, MERLIN Radar can provide real time bird avoidance information.

BAM is based on historical bird activity and predicts risk over defined regions over a two-week block of time. AHAS utilizes BAM forecasts combined with historical radar data collected during the current two-week period as well as a separate forecast employing data over the last hour. AHAS NEXRAD compares a near real-time "positive bird detection" database via correlated radar hits with BAM, then 5 displays trend data for aircrew to interpret. The greatest limitation of these models is their inability to provide an altitude estimate for the avian hazard.

AHAS NEXRAD employs Doppler radar to identify both weather and large flocks of migrating birds. Algorithms filter out the weather data and display a general location of observed bird activity. Real-time bird avoidance information can only be obtained with the MERLIN radar system. MERLIN automatically and continually identifies and tracks the location and altitude of individual birds and records the data for analysis and archiving. Using this data, a risk advisory is relayed to aircraft in the vicinity. Unfortunately, this program is in its infancy and is only available at Dare County Range, NC (see "Bird Detection Radar Development" on page 4.)

With a better understanding of BASH in our tool boxes, we can now focus on what we as aviators can do to get the mission done. Awareness of the local threat and avoidance of those threats are essential in exercising proper ORM for each mission. This begins with knowing your wing's BASH plan and utilizing the bird strike information available on the ground and in the air.

AFI 91-202, *The Air Force Mishap Prevention Program*, requires each installation to implement an effective BASH program. This program is located at both your wing and squadron Safety offices or on the wing Safety website. Information will include local restrictions when risk levels exceed low, and local assets available to aircrew for mission planning and airborne advisory.

Building a picture of the threat from each mission begins with US BAM. This tool is useful the day prior to a sortie, for a general idea of what will occur in the next 24 hours. For the time period less than 24 hours prior to your mission, AHAS will provide a forecast risk more accurate than BAM and will allow crews to select individual VR/IR routes with the least predicted hazards. When airborne, accurate current-hour advisories can be accessed via your Top 3, supplying crews with near real-time information for the route selected. AHAS and BAM are available at www.usahas.com. Finally, crews can utilize MERLIN assets, if available, for real-time data and risk advisories. Your safety office can update you on the status and location of MERLIN as it reaches other areas.

The normal challenge crews experience with BASH is the MODERATE risk level for large areas and extended time periods, preventing training below 1500 feet AGL within the local area. The short-term solution is aircrew diligence. Deliberate and comprehensive mission planning, thorough ORM, flexibility, and creativity offer the best chance of completing the mission. Honest feedback to your weapons officer, flight safety office, and squadron leadership regarding the usefulness of the BASH program allows for an honest assessment of how much risk the squadron is willing to take to get the mission done.

The long-term solution is BASH preparation in your scheduling shop and at your wing flight safety office. Squadron scheduling must show foresight and be aware of where and when the bird hazard is forecasted to increase. If we know that the local low levels will be moderate for the entire winter season, a training deployment during that period may get the squares filled on time. Be creative, and work with your leadership to find the best solutions to your unique mission requirement.

Wing safety can also increase mission effectiveness by executing a solid BASH plan all year long. If AHAS is continually advising bird moderate, route surveys to assess bird risk may be increased to provide current data back to the experts who write the BAM and AHAS algorithms. The more accurate the algorithm, the more accurate the advisory risk these products return.

Training at low altitude, while tactically proven, remains one of the most task-intensive flight regimes. It is with great necessity that we train in the environments in which we expect to fight. If kept accurate and used to its full potential, BASH enhances our ORM processes and allows us to ensure our formations return home safely. With solid flight leadership, we can be confident that Number Four has received the best training available before launching for war.

BASH Avoidance

1LT BROOKS M. WALTERS
509 BW
Whiteman AFB MO

Photo by Don S. Montgomery, USN (Ret.)
Photo Illustration by Dan Harman

Four-Ship… Fun? Absolutely! Right up until you add two nice, big, red-headed turkey vultures at pattern altitude.

That "Four-Ship Friday" started out just like any other day of the week; two or three clouds in the sky, the sun peeking over the horizon. I arrived early to get the boards ready for the ominous first four-ship brief, while the well thought-out schedule was promptly being mortared by DNIFs and other show-stoppers. Not that changing the names for the four-ship up until brief time was a factor, but it may have disrupted the tenacious attitude of all the players that morning.

Brief, step, ground-ops, and taxi all went as planned. As we took the runway for a 2x2 15-second interval takeoff, a winged something-or-other crossed the ground.

"Tower, Harley 51, there's a large raptor over the hammer head, 50 feet AGL…Roger, all aircrews be advised."

Now, I didn't see if that raptor had a buddy, but maybe he found a mate and floated up to 2,700 feet MSL. Either way, all raptors look alike at 300 knots, don't they? If that foreshadowing wasn't enough, after takeoff and pushing my wingman out to route, another raptor passed between us, and the not-so-standard radio call followed.

"Tower, Harley 51, there's a raptor at 100 feet AGL departure end…Roger, all aircrews be advised."

Sound familiar? Three and Four, however, never saw the raptor.

"Harley 51, push 12."

Finally joined up, the sortie went as briefed "up where the air is rare" and raptors should be

hypoxic, or so you'd think. You know, the highest reported bird strike is like 37,500 feet MSL. Look up that crazy statistic and you'd also find out someone had a midair with a cat…sorry to all you cat-lovers.

Anyway, the area work went as planned, so we got ATIS (bird watch low!) and started back home on a standard four-ship RTB from the MOA. The lead aircraft kept us in a route formation on the way home…we had done a lead change halfway through the sortie to give Number Three (at that time) experience leading a four-ship. This meant I was now in the Number Three position. The RTB was uneventful until the lead aircraft cancelled IFR and was explaining to Approach what we wanted to do.

"Center…disregard…Approach…Harley 51, 15 southeast, with mike, request."

"Go ahead request."

"Harley 51, request up initial to pitch out four-ship full stop."

(Approach) "Confirm you want a straight-in, Harley 51."

"Negative, Harley 51 requests up initial."

To make this quick, as you all know Approach does not always understand what up-initial is, or even what "initial" is. Approach considers a straight-in, a flight path that is aligned with the runway, which translates to us as either initial, or a straight-in.

Anyway, this comm jam put Lead behind the situation, and we were still in a route formation as we turned on about an eight-mile initial. With a little prompting from myself, Number One finally got the four-ship into an echelon left formation, so we could break to the right for inside downwind and a full stop. "Tower, Harley 51, three-mile initial." So, to set the stage, the four-ship is now in echelon left with three-foot wingtip clearance, one mile from the approach end. Each pilot is focused on the aircraft to their right and...

"Bir…climb."

All of a sudden, at the same time One went into the break, Three and Four performed the port side of a "beautiful" starburst maneuver.

As Three, we're now climbing away from the formation, and a huge black bird has just passed underneath us. Four shot left to avoid a second bird that was headed right for their nuggets (according to them), and Two is still heading up the runway waiting to break and follow One. Imagine what this cluster looked like from tower's perspective.

So now, we're about 500 feet high, we can see Four off to the left and can strain to see Two, who has now gone into the break.

"Tower, Harley 51, there are raptors right at pattern altitude approach end, request straight through initial…"

To shorten this story up, we went around the container, Four performed a BD check, which came up clean. Both birds, on our second time around, were not a factor and according to tower had moved east of the field. We came up initial, pitched out and landed uneventfully.

Moral of the story: All formation briefs talk about bird avoidance, and how you should take the small bird rather than the big bird. Be sure to listen up, and think of what you will do, because reactions with aircraft in that close proximity can be a lot worse than just a harmless starburst. Luckily, as Three, our first instinct was to climb, because breaking to our right or left could have changed this whole situation.

So, I'll leave you with this: Birds will typically dive, but sometimes big ole' stupid turkey vultures will not. And "You never, never, hit your wingman" (paraphrasing Jester, from "Top Gun").

NEVER SAY NEVER.

MAJ JOHN DICKMANN
161 ARW
Phoenix ANGB AZ

Have you ever said or thought, "That can't happen to me"? Well, I used to be one of those people. The world was very black and white for me. Things were either right or they were wrong…that simple! The gray was for those who lacked the spine to see the line, or liked to move it around to their benefit. Not me! OK, OK; I hear you. "Where are you going with this, and how does it relate to safety?" Two words for you, my friend: Go-around!

The "Go-around" call. We have all probably said it, and most have had it said to us. Unfortunately, many of us have seen this called by a crewmember, only to have it ignored. Nothing breaks down a crew's trust faster than feeling ignored—especially if one doesn't have access to the controls! After witnessing this a few times as a young dude, I swore I would never do this to my crew. I would always honor this call…even if I didn't agree with it. Heck, we can always talk about it on downwind, or when we get on the ground. No big deal! I just couldn't imagine a reason to ignore the call or break that trust. Certainly an overabundance of pride wasn't a reason for me!

Then the day happened. My Boom Operator called a "Go-around." I elected to not initiate the Go-around, and instead landed in my own "Never, Never Land." I know what you're thinking now: The rest of this article will be me convincing you why I was correct in ignoring the "Go-around" call. Well, you're right, but only partially. Somewhere along the way I hope you find "rarely" a better word than "never." I also hope you see CRM and Risk Management as a journey versus a destination, and that the Aircraft Commander is…well, just that!

So there I was (you knew that was coming), the Aircraft Commander of a KC-135R, TDY to Howard AFB in Panama, supporting the anti-drug operation. My crew consisted of a brand-

..OOPS, I JUST DID!

USAF Photo by SSgt Jocelyn Rich / Photo Illustration by Dan Harman

new Boom, a Copilot on his first TDY and me, with one whole year under my belt as an AC. We were on our third or fourth sortie of the TDY, just enough to appreciate the challenges of landing a KC-135 on a relatively short runway during the rainy and Phase II bird season. On this day we accomplished our mission, came back to Bird Condition Severe, set up our holding as required, and waited for either the status to change or to hit bingo. At bingo, the OG could either send us to our alternate or waive us to land. We approached our bingo and called for the Bog's decision. The words we received stated there were problems with the alternate, and that we were cleared for one approach to a full stop.

Being the good AC I was, I took an extra spin in holding and made sure my crew knew what we were about to do, and that they each knew what I expected of them on the approach and landing. I asked the Boom to sit in the jump seat so he could better monitor the AOA during approach, provide an extra set of eyes for birds, and back us up on runway remaining for a possible "Go-around" decision. I briefed the crew on the landing data and told them if we weren't down by the 6,000 feet remaining marker, we would have to "Go-around." I asked the Copilot to back me up on AOA, airspeed, and bird avoidance. I explained that I would be primarily "eyes outside" looking for birds. Now, some of you might like to get distracted on the wisdom of flying an approach to land under bird condition severe, but let's just leave that for another article (maybe you can write that one).

We started down the glide slope and started seeing birds right away. I mean, *lots* of birds. We were jinking left, then right (as much as you can in this big family model). We were climbing, then diving. The birds were everywhere, and we maneuvered to avoid them as best we could.

You probably remember your instructor at pilot training telling you "a bad approach leads to a bad landing." And he was right! But today was a day for breaking these antiquated generalizations. I touched down so softly that I was the only one who

even knew we were down. (All right, even I was a little amazed.) As you might have expected, my young Boom, seeing the 6,000-foot marker fly by (and I believe not realizing we had already kissed the ground), called a "Go-around." At this point, time slowed down—I mean *way* down. I heard the "magic words" and began processing all the info. I had instructed the Boom to call a "Go-around" if we weren't down by the 6,000-foot marker. I looked down the runway to see if I had missed something. Nope, nothing; all clear ahead! I remembered the game of dodge ball we had just played coming down final with the birds, and most certainly did not want to risk that again, if we didn't need to.

Risk Management, CRM, the A-Code…these things all came running through my cranium (that's for the fighter guys). What came oozing out the right ear felt like the right decision, so I went with it. I made a calculated decision that the Boom had called the "Go-around" because he didn't know we were down. I thought to myself, "I'll be damned if I'm taking this back in the air! We are down and we are staying that way!" We rolled to the end and taxied in, glad to be done. Before I could explain to the Boom what happened, he began apologizing profusely. I told him he "did good," and we would talk about it over a beer back at the crib.

What my young Boom didn't realize is that I was proud of him. He did just what I had asked of him. I had some lingering questions about my own decision, but that went away quickly as I mulled over what had happened, and my reaction. My concern and hope shifted to my crew, more importantly to my Boom. He needed to walk away knowing he had done good, that he had not been ignored, and that I had exercised my authority and duty as the aircraft commander to ensure the safety of my crew and airplane. After much soul-searching and a little beer (or maybe the other way around), we hashed out what happened, what we learned, and why we each should do the same thing if we did it over again.

This experience stayed close to me for some time, and then about the time it started to go into long-term memory, I found myself on the opposite side of the issues, the "ignored" instead of the "ignorer." Fast forward three years, move East to the continent of Africa, make it night, in the weather, to an unfamiliar airfield in Ethiopia. The crew were all highly experienced instructors, with me in the jump seat. Remember that old saying, "a good approach leads to a good landing?" Well, not that night! We hit the ground like a quarter at a college frat party...well, you get the picture. We must have bounced 100 feet in the air! All I could think of was my training (and my wife and kids). Big bounce…*really* big bounce!

"Go-around, go-around!" These are the words I yelled as soon as I got my mouth back up from around my boots. I knew we had lost so much energy that we would hit again, but maybe the

USAF Photo by SSgt Joshua Strang

engines would spool up in time to decrease the severity of the next hit. (At least that's what I'm thinking). Then I heard the AC, an experienced instructor/evaluator (and a damn good pilot), say "*No*, we are landing this now!" I braced for impact, and actually thought about what the accident report was going to say. I distinctly remember saying to myself, "I can't believe I'm going to die or be in an accident in Ethiopia! What a lousy night and a lousy place to have this. Who's gonna be able to help us?"

Of course, I was still in a time warp. In what seemed like an eternity, the second pounding arrived, even harder than the first. I think I bruised my chin on the floor on this one! Somehow, the plane stayed together and we stayed on the runway. We taxied clear, parked, and just looked at each other…mostly in shock. Our MX guys got out and actually kissed the ground, as did a few passengers (the ones who could still bend over). I heard some folks say they would never get on this plane again. I couldn't blame them; this was not a hard landing, it was a survived crash!

Later that night, the flight deck crew got together at dinner and discussed what happened. The Nav and I were angry. We both believed this was a "Go-around" situation if there ever was one. The AC explained he was concerned the plane might not be capable of flight (gear broke, engines flung off, bent controls, etc.), and that his best option was to put it down with whatever we had at low energy. I thought about this, but not very long. I disagreed with him and went to bed, happy to be alive. Needless to say, we would have a few days to continue our discussions, and I would have time to think more. The next day I remembered a flight I had made in Panama a few years back. I recalled the feeling of knowing deep inside what I had done was right—ignoring the "Go-around" call and exercising my authority and duty as Aircraft Commander. Was this really any different? Maybe, maybe not. I finally concluded that while I didn't agree with his assessment, I did understand and respect his position as the pilot at the controls and as the Aircraft Commander. We were and are still friends.

These two similar and yet opposite experiences have had great impact on my flying philosophy. They were the only events of temporal distortion I recall in my 14 years of flying. For me, they combined all the facets of Risk Management, CRM, Aircraft Commander authority, aviation generalizations, and time-critical decisions into one action-packed event. I'm sure many of you have had experiences far more stressful than these, but I hope you are able to take something from this, even if it's nothing more than the idea that what we do is fluid, challenging, and rarely routine. Be ready, and use all the tools you have.

And never say "Never," or "Can't happen to me!"

FY07 Aviation Mishaps (Oct 06)

3 Class A Mishaps (3 Flight)
0 Fatalities
2 Aircraft Destroyed

FY06 Aviation Mishaps (Oct 05)

4 Class A Mishaps (1 Flight)
0 Fatalities
0 Aircraft Destroyed

02 Oct ✈ A C-21 departed runway near approach end and caught fire; crew egressed safely.

02 Oct An F-15E had multiple bird strikes; damage to # 2 engine and left wing.

26 Oct ✈ An F-16C caught fire on takeoff; pilot aborted and egressed safely.

- A Class A mishap is defined as one where there is loss of life, injury resulting in permanent 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.
- "✶" Denotes a Class A mishap that is not in the "Flight" category. Other Aviation categories are "Aircraft Flight-Related," "Unmanned Aerial Vehicle," and "Aircraft Ground Operations".
- Air Force safety statistics are updated frequently and may be viewed at the following web address: http://afsafety.af.mil/stats/f_stats.asp
- **Data includes only mishaps that have been finalized as of 20 Nov 06.**

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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.

MAJOR WILLIAM DENEHAN
16th SOW
Hurlburt AFB, FL

Major William Denehan was awarded the The Aviation Safety Well Done Award in recognition of his exceptional performance as co-pilot of a UH-1H, 6th Special Operations Squadron, 16th Special Operations Wing, Hurlburt Field, Florida. Major Denehan distinguished himself with great aerial skill during an in-flight emergency on 22 May 2006. While flying on an over water training mission at 200 feet, his single engine UH-1H helicopter experienced a mechanical malfunction creating a critical engine overspeed. Major Denehan immediately noted the illuminated high revolutions per minute caution light and quickly analyzed the malfunction. He took positive control of the aircraft and immediately increased the collective which likely prevented a catastrophic engine failure and explosion. While the pilot in command continued to run checklist items, Major Denehan located an emergency landing area and safely brought the UH-1H in for an uneventful landing. His incredible display of systems knowledge, expertise and professionalism were directly responsible for the safe recovery of a multi-million dollar aircraft.

Bird / Wildlife Aircraft Strike Hazards

See page 3