

# WINNING THE BASH "WAR" IN PANAMA

## Combating the bird strike hazard with a special radar

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As the 24<sup>th</sup> Operations Group commander, Col Dave Scott, said in the middle of the fall 1998 bird migration season, "It's a war out there."

Thanks to tower, civilian bird dispersal technicians and base augmentees, a ramp coordinator, and pyrotechnics on the flightline, by the end of November the war had been won. No damaging bird strikes, either on the field or in the critical approach and departure paths. But to explain how this happened, let me take you back to July 1998 and describe the risk control measures we instituted, including the key to our BASH Program-incorporating a modified marine radar to detect birds both on and near the runway.

In the summer of 1998, we started planning for the North America to South America bird migration, and reassessing our actions to mitigate the risk. From past experience and Smithsonian ornithological data, we were very much aware that from October to late November, Howard is essentially "attacked" by migratory birds who use the Panamanian isthmus to navigate to South America.

The challenge is great. Countless millions of raptors and songbirds use Panama as a navigation and feeding route, soaring on the thermals and updrafts created along the Pacific coast. Counts over the airfield have been recorded as high as 200,000 per hour. This threat is in addition to the constant presence of vultures, egrets, pelicans, and gulls native to Panama. An active, well-orchestrated defense was in order.

### Improving Our BASH Program

Howard has always had a strong BASH program. Pyrotechnics and culling are mainstays. And it shouldn't go unsaid that Civil Engineering support was crucial to clear and drain grassy, low-lying areas to re-

move feeding and nesting places.

Yet we found a variety of improvements to make. First, we redesigned a SID on the south departure to avoid Venado Island where vultures tend to hover on thermals in large numbers. The offset non-precision approach still goes directly over Venado Island, but the ILS comes straight in, so crews are advised to use it whenever possible.

As the migration season approached, we trained personnel from across the base in bird dispersal and gave them copies of our airfield schedule. These augmentees were not only crucial to manning the program but their support showed the entire base understood the danger and was ready to contribute to the solution.

We added a senior NCO/rated officer position to our bird dispersal teams who we call RAMPCO (for ramp coordinator). While the SOFs handle support for their deployed assets, our RAMPCO ensures a safe airfield environment by orchestrating the actions of our civilian bird dispersal technicians, Base Operations, Tower, and 24th Wing augmentee personnel. This includes stationing personnel at both ends of the runway during migration season and aggressively dispersing birds.

We also expanded our interior bird exclusion zone to cover the visible areas off the ends of the runway. Our interior exclusion zone represents areas where the bird dispersal team can attack birds with sirens and pyrotechnics. Because we can get at the birds here, there is a zero tolerance policy for large birds. Even though we have limited ability to disperse birds a mile or two off the approach and departure ends of the runway, it is part of our BASH team cross-check to scan the flight path before every takeoff or recovery.

We call these expanded areas the "Bird Critical Zone" (BCZ). With the BCZ, we may elect to operate with birds in the vicinity of the airfield, but the BCZ focuses our detection on the critical departure and arrival regions. Because of differences in operating characteristics of prop and jet aircraft, we can accept some bird activity

near the exclusion zone as long as we are aware of it and have the approval of the appropriate SOF.

### Better Eyes for Spotting Birds: Modified Marine Radar

In addition to internal improvements to our control measures to accomplish the mission safely, our most significant enhancement in last fall's BASH program was the inclusion of a prototype radar specifically designed to detect migration streams and larger birds. We latched onto a rare chance to host a research team from Clemson University. Dr. Sid Gauthreaux had been at Howard the previous fall looking at ways to tune the tower D-BRITE (GPN-20) radar to detect birds. While there was some success, terrain and backscatter along the tree line made the radar unsuitable for air traffic control when configured to look for birds.

Dr. Gauthreaux was invited to return to Panama, under the sponsorship of the DoD Partners in Flight Program. He accepted, and we arranged shipment of his equipment (a 3,000-pound trailer) to Howard. We established his team at the alternate tower (old runway

supervisory unit) on the field and ensured they would have 24-hour access. We integrated them into our BASH team as a working element, responsible to the RAMPCO to assess migratory activity that might pose a threat to flight operations.

The prototype modified marine radar Dr. Gauthreaux brought to Panama this time was an attempt to overcome the deficiencies of the GPN-20. Unlike the D-BRITE mono-chrome display, the marine radar has a color Doppler system, allowing one to easily distinguish targets and see track history trails in different colors. Using some relatively straightforward tuning techniques, the researchers could easily see individual medium- and large-sized birds and migration streams. Using basic trigonometry, they could also estimate the altitude of the birds by adjusting the 3-degree beam-width radar.

The results of the tests and the positive effects on our BASH program were outstanding! The Clemson team identified birds before they could be seen over the field, giving us advance notice we never had before. The radar told us where the migratory birds were massing, which allowed us



Figure 1. The prototype modified marine radar brought to Panama this time was an attempt to overcome the deficiencies of the GPN-20. Unlike the D-BRITE mono-chrome display, the marine radar has a color Doppler system, allowing one to easily distinguish targets and see track history trails in different colors.

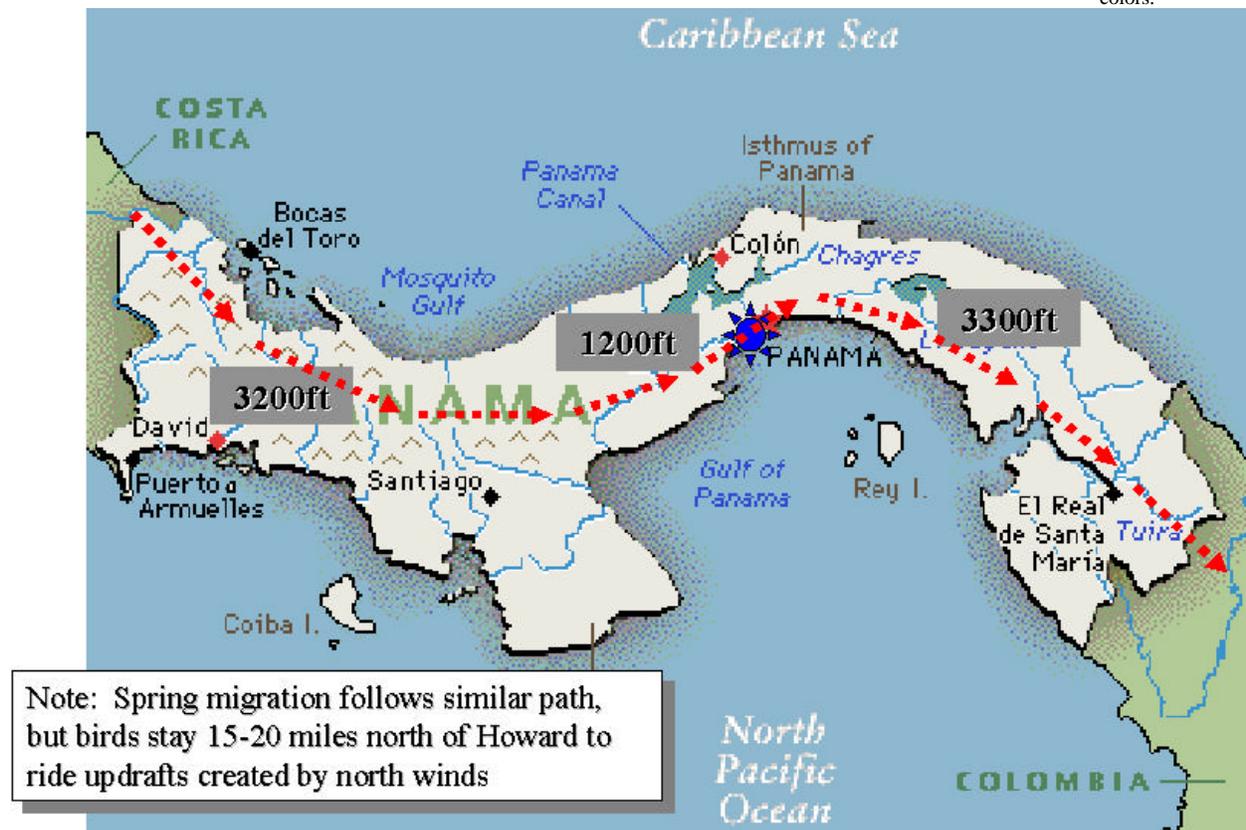


Figure 2. Howard AFB is situated on the flight path of many birds migrating to and from South America.

to switch active runways or delay flights to avoid the concentrations. Dr. Gauthreaux also determined an early evening migration pattern (the birds were thought to be on the ground after sunset) and a later evening feeding behavior. (See accompanying photos.) Both were crucial data points for our safety responses. And Dr. Gauthreaux is credited with a "save" by providing timely information that held an F-16 departure until after a stream of birds had dissipated. The addition of "eyes" beyond the perimeter fence was a great improvement. We see this as a tremendous initiative for a base like Howard, where migratory and year-round birds create a very real threat to property and lives every day. The ability to "see" individual larger birds around airfields will be invaluable.

### NEXRAD

We should distinguish this prototype system from the other more widely known bird radar initiative. The Next Generation Doppler Weather Radar (NEXRAD) systems now in service nearly everywhere in the United States are being used to identify movements of large flocks of birds. Using radar to identify flocks of birds started as a research and conservation effort, but it does have some significance to military aviation. Partners in Flight works to reverse the decline in populations of neotropical migratory birds. While this might seem at odds with a BASH Program, in fact conservation helps forward military aviation. When birds become endangered, they enter a legal status that adversely affects our ability to build airfields and conduct training. Also, radar detection of bird patterns can assist in designing safer training routes and may have combat applications in selecting ingress routes to targets. But while NEXRAD can pick up the movement of large masses of birds, the prototype marine radar has a more "tactical" application. Dispersal teams and ATC can react in real time to the threat posed even by individual birds.

Our vision of the future of bird radar programs involves two distinct systems. NEXRAD use for bird movement detection and forecasting is well underway and is even being posted on the Internet. This NEXRAD information can be used to

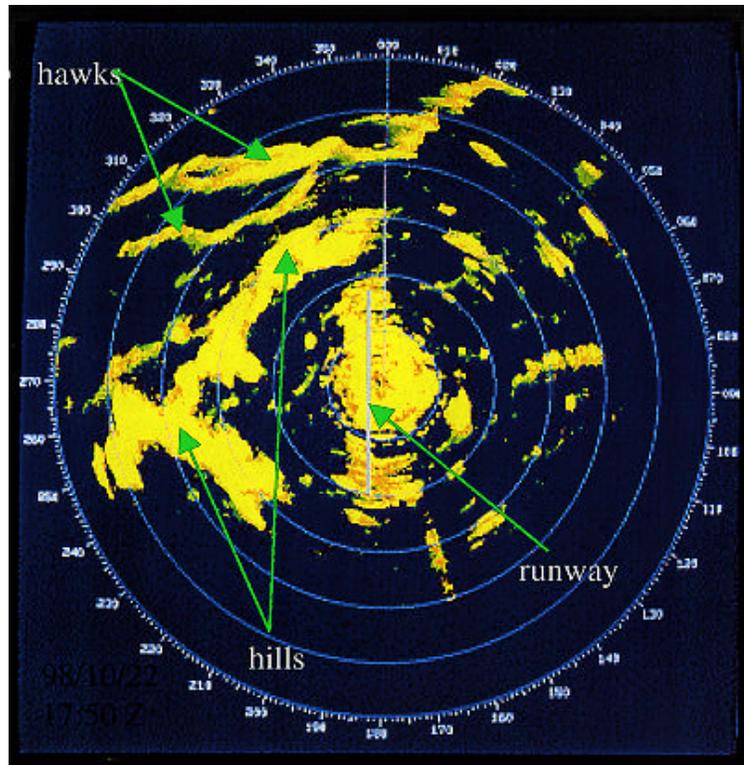


Figure 3. Radar return of hawks migrating.

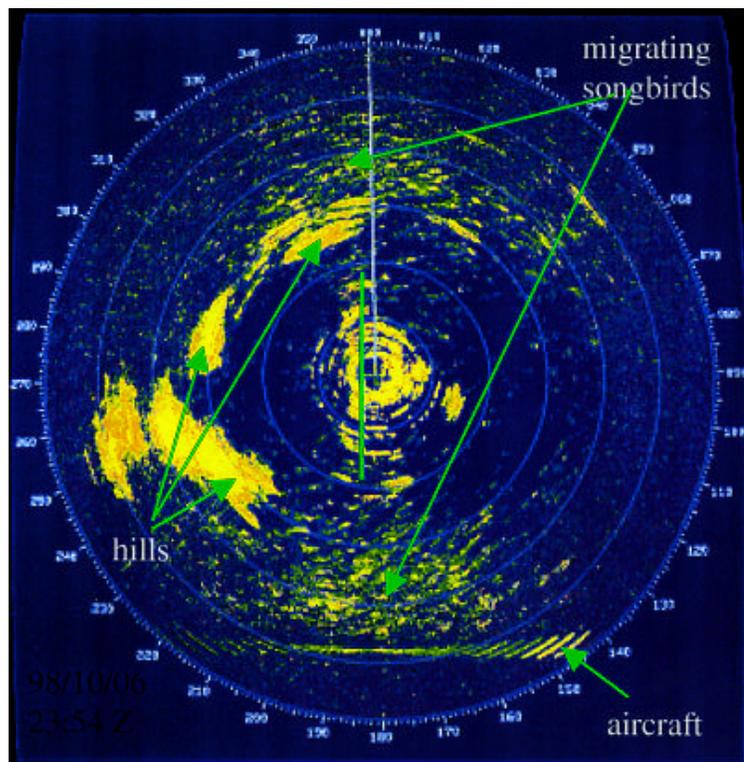


Figure 4. Radar return of songbird migration.

## FOR THE BIRDS?

The typical routes for migrating birds "heading south for the winter" cross the Caribbean over Cuba and also pass through Mexico and Central America. You probably don't need a map of the region to determine that wherever they start from, they all come through Panama, and most will pass directly over Howard in the fall. Taking a closer look at the Panama section of the fall migration, the birds will pass over the base as they follow their instinctive path along the southern coast. Only when the wind blows unseasonably from the north will the birds move inland (as we normally see in the spring migration). It's also important to note that the birds fly at essentially "pattern altitude" (1,000 feet AGL) as they cross Howard. The migrating birds come in all sizes, from tiny songbirds to hawks weighing a couple of pounds. And we have large numbers of egrets and soaring vultures year-round, giving our BASH teams plenty to do. As the 24th Wing commander, Col Greg Trebon, has said, we could avoid all BASH risk by simply not flying-but that's not an option. We have to maintain our capability to conduct critical airlift ~ and counter-drug missions for US Southern Command. And while we did prudent scheduling to avoid the heaviest periods of bird activity, our Operational Risk Management approach had maintaining mission capability as its bottom line. We had the opportunity to prove that when hurricane Mitch struck Central America. From November until well into the new year, we assisted two JTFs and the people of the region, with over 55,6 million pounds of relief supplies passing through Howard in the weeks following the worst disaster to hit Central America in 200 years.

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schedule missions away from bird threats and to advise crews prior to flight. We see this as part of a mission-planning or preflight briefing.

In contrast, the modified marine radar system tested at Howard demonstrated a focused, real-time capability to protect crews on departure and arrival. We believe this radar system could be readily adapted, using small computer technology, to allow an air traffic controller to assess the bird state. The system we envision is simple and cheap. In our inquiries, we determined the entire radar system cost to be well under \$50,000.

### **"The Bottom Line"**

To summarize, the modified marine radar tested last fall was an impressive adaptation of existing technology. We gained new knowledge into our bird threat, and we made important safety decisions based on that knowledge which paid off in a mishap- and damage-free period.

As most of you know, Howard AFB is set to be turned over to the Government of Panama at the end of 1999, in compliance with the 1977 Carter-Torrijos Canal Treaty. Our fear was that the success of our fall BASH program might go unrecorded. To prevent that, we've briefed COMACC, AFSC/CC, 12AF/CV, and the MAJCOM Flying Safety Conference to ensure the results of Howard's fall BASH program are not forgotten. Taken in context with other bird detection efforts, this is another piece of technology to dominate the BASH "battlefield." We could be on the edge of a revolution in BASH safety.

(The author wishes to acknowledge Dr. Gauthreaux and his wife, Carroll Belser, for the photographs used in this article and for their devoted work to enhance flying safety at Howard AFB and elsewhere.)