

## The Use of Border Collies in Avian and Wildlife Control Programs

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### Abstract

In February 1999, Southwest Florida International Airport (RSW) became the first commercial airport in the world to employ a Border collie in an airfield wildlife control program. At RSW, strike data for the months of January 1998 through September 1998 showed 13 confirmed birdstrikes. After employment of a Border collie the following year, strike data for the same months (January 1999 through September 1999) showed 0 birdstrikes. Since then, several other airports and airbases around the world have instituted similar programs at their facilities – including Vancouver International Airport, the U.S. Air Force, the Canadian Air Force, the Israeli Air Force, and several regional airports throughout North America – each having met with similar success.

On February 1, 2000, Dover Air Force Base in Delaware, United States, became the first Air Force base in the world to utilize a Border collie in its airfield wildlife management program. Results from Border Collie Rescue's program at Dover AFB are tremendously encouraging, as a substantial percentage of birds (particularly large waterfowl) were excluded from the airbase and the surrounding farmlands, an overall area encompassing roughly 46 km<sup>2</sup>. Total bird numbers were reduced by more than 150,000 birds (99.9%) within a short initial 1-month period and have remained at minimal levels for more than 13 months. Damage to aircraft at Dover AFB caused by birds has also been dramatically reduced, from an average of US\$600,000/year for the preceding two years to US\$24,000/year after the initiation of the Border collie program.

At Ramat David Air Force Base in northern Israel, a three-month experimental program conducted during the fall migration period of 2000 demonstrated marked reduction in bird populations in and around the base, as well as the elimination of large migratory birds from an area extending more than 3 km. from the perimeter of the airfield.

At Cold Lake Air Force Base in Alberta, Canada, studies conducted by airbase officials have shown the virtual elimination of runway incursions by deer after employment of a single Border collie -- from a weekly average of 45 runway incursions per week in 1998, and 61.25 per week in 1999, to 3.5 per week after the introduction of the dog in 2000.



## **Introduction**

Airports attract large numbers of birds and deer primarily because they offer immense tracts of foraging and nesting habitats free from the threat of predation. Border collies can serve as an effective means of wildlife control in these environments by introducing a predator into the ecosystem. Many wildlife dispersal methods seek to imitate predators or the effect of predators and become increasingly ineffective as the birds or deer habituate to the stimuli. Border collies however, are true predators, representing an actual, not perceived, threat to wildlife, thereby eliminating the problems of habituation. Since Border collies are under the direct control of a handler, they disperse wildlife only in prescribed areas and at the direction of the handler. Border collies can be stopped at any point in time, by either recalling the dog to the handler or lying the dog down. Border collies, being top predators, elicit flight reactions from almost all forms of wildlife and birds. Border collies have been bred to run a hundred miles a day and will work for hours on end. Not only can they deter the largest of birds, particularly Canada geese, but are also highly effective against wildlife like deer and groundhogs. Border collies are also bred not to harm wildlife, including birds, so they can be employed in dispersing protected or endangered species of birds or mammals. A single Border collie and handler can easily maintain an area of approximately 50 square kilometers (19 square miles) free of larger birds and wildlife.

In February 1999, Southwest Florida International Airport (RSW) became the first commercial airport in the world to employ a Border collie in its airfield wildlife management program. Since then, several other airports and military airbases (including Vancouver International Airport, Dover Air Force Base, Augusta Regional Airport, and Cold Lake Air Force Base) have initiated programs utilizing Border collies in their avian and wildlife harassment campaigns. The results of a two-year study conducted at RSW suggest that the use of Border collies in the airport environment can serve to greatly reduce the strike risk to airplanes by eliminating the presence of some avian species and markedly reducing the overall numbers of other species. Data from bird counts conducted at Dover Air Force Base after the introduction of a single Border collie into their wildlife management program show the virtual complete exclusion of larger bird species (primarily geese and ducks) within the airfield environment and up to an additional 4-km radius outside the perimeter fence in only a four-week period.

Border collies avoid the primary limitation of almost all other forms of harassment – habituation. Border collies are effective because they are true predators, representing an actual, not perceived, threat to wildlife. Birds and wildlife do not habituate to Border collies since the dogs are essentially top predators and are continually moving and changing behavior. Border collies are now the fastest-growing and most popular form of bird control on golf courses and other venues across North America. The reasons for this are numerous but the primary rationale is that they are highly intelligent, adaptable and intense working dogs that are able to cope with most species of bird and larger wildlife in all but the worst of environments and circumstances. Airport and military officials are discovering the true advantages of putting a herding dog to the task of harassing geese

and a wide variety of other bird and mammal species, with a small investment of finances and initial handler training.

All dogs described in this manuscript were trained and placed by Border Collie Rescue, Inc. Border Collie Rescue (BCR) is a US-based national non-profit humane organization that assists in the rescue and placement of Border collies in the United States and throughout the world and their Birdstrike Control Program is designed to improve air safety for commercial and military aviation operations by training Border collies in the specialized task of airfield wildlife control. BCR is the only organization in the world currently training dogs for wildlife control at airports and military bases. BCR trained and placed the first dog in the United States to ever be employed by a commercial airport for bird strike control (at RSW), as well as the first (and only) dogs to be used by the U.S. Air Force, the Canadian Air Force, the Israeli Air Force, and Canadian commercial airports. BCR was also the first in the world to introduce a trained dog for bird control in the aquaculture industry.

## **Program Results**

### **Southwest Florida International Airport (RSW)**

In June 1997, RSW contracted with the United States Department of Agriculture (USDA) to conduct a baseline 11-month ecological study of the airport environment and its wildlife. The USDA study recorded 113 wildlife species within and just outside the aircraft operations area (AOA). The majority of observed wildlife species were birds - primarily wading birds, waterfowl, and crows/blackbirds. These three categories of birds accounted for more than 92% of all the wildlife observed. To combat this problem, RSW decided to acquire a specially trained Border collie for their wildlife harassment program from Border Collie Rescue, Inc. After the employment of a single Border collie on Feb. 11, 1999, RSW commissioned a comparison study to measure the effect the dog had on wildlife populations. The airport contracted with Kevin L. Erwin Consulting Ecologist (KLECE) to survey the wildlife from February to September 15, 1999 and to analyze and compare the datasets.

In 1999, after the introduction and use of the Border collie, wildlife monitoring showed a significant overall reduction in the number of species as well as the total number of birds in each category. The 1999 survey revealed a 29% reduction in the overall number of species in the top 4 categories of birds (wading birds, waterfowl, crows/blackbirds, and raptors). Additionally there was an overall reduction in the number of individual birds observed. The abundance of wading birds in the 1999 survey was less than half that observed in 1997/98.

Bird counts reduced dramatically immediately after the employment of the Border collie and remained low for the duration of the survey period, except for two periods of moderate increase in late April and August (Figure 1). The rise in blackbirds in August was primarily due to a single large flock of more than 300 individual birds that was observed on the AOA, influencing the August average. The increase in wading birds in

April was most likely caused by the absence of the Border collie. After only two months of work at RSW, bird numbers were so low that the dog resorted to herding alligators – one of the few remaining moving objects left on the AOA. The dog was returned to Border Collie Rescue for additional training in alligator avoidance and in his absence, bird numbers began to rise significantly.

Additionally the Border collie had a dramatic effect on the behavior of birds on the AOA. Almost all of the birds that remained on the AOA after the introduction of the Border collie congregated in a large drainage ditch several hundred yards south of the runway. Due to the presence of several alligators in the habitat, the dog was not allowed to harass wildlife within the drainage swale. As a result, a small number of waterfowl and wading birds that were flushed by the dog in open areas of the AOA sought refuge in the deep-water habitat of the swale. Before February 1999, large aggregates of birds would forage and loaf in the open grassy areas around the runway. After the Border collie began its work, most birds responded by vacating the AOA altogether but the few individuals that remained relocated to the protection of the wide drainage swale, several hundred yards further from the runway.

The Border collie also prevented pairs of Florida sandhill cranes from nesting or roosting on the AOA. Prior to the dog’s arrival, at least two pairs of sandhill cranes were observed nesting within the AOA each year. The dog managed to successfully prevent any pairs from breeding within the AOA in both 1999 and 2000, even though the dog was introduced into the habitat in 1999 only weeks before the normal nesting period. Sandhill cranes pose the most significant threat to aircraft operations at RSW and the minimization of their time within the AOA (as well as the exclusion of any immature birds) represented an important accomplishment for the Border collie and the management program.

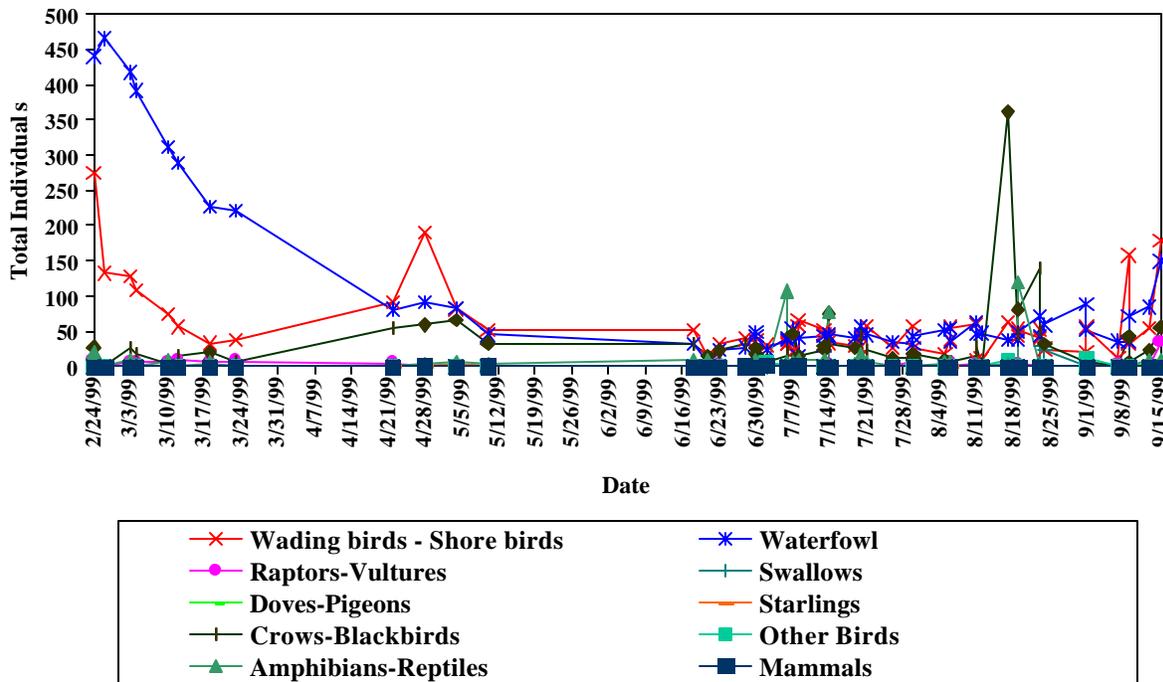
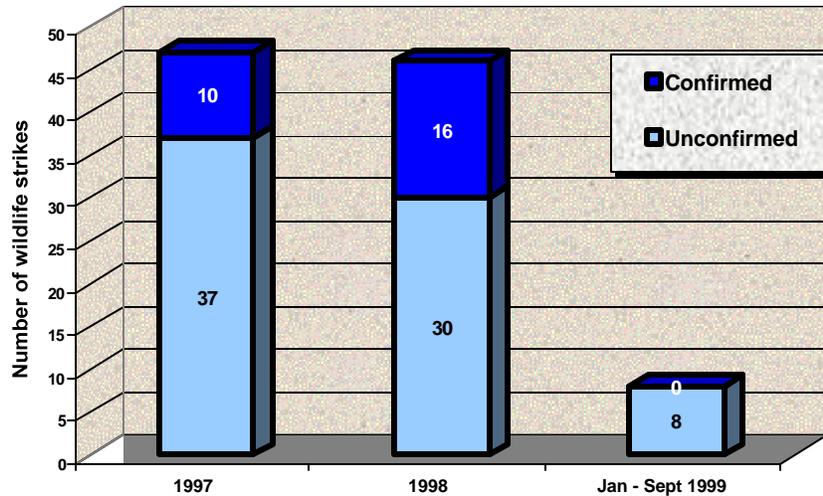


Figure 1: Bird count data for Southwest Florida International Airport after the employment of a single Border collie on Feb. 11, 1999

Even more significant, the number of bird strikes to aircraft dropped to zero during the study period, after the introduction of the Border collie. RSW recorded ten strikes in 1997 and 16 in 1998 (Figure 2). Since the conclusion of the study, there were 4 bird strikes through February 2000 (an additional 5 months). Two of the birds were soaring raptors, which the Border collie could not reach in his harassment work. None of the bird strikes recorded during the dog's work have resulted in damage or passenger delays. Unconfirmed strikes also dramatically fell, from 37 in 1997 and 30 in 1998, to 8 unconfirmed strikes from January to September 15, 1999.



**Figure 2: Comparison of bird strike data for RSW before and after the utilization of the Border collie.**

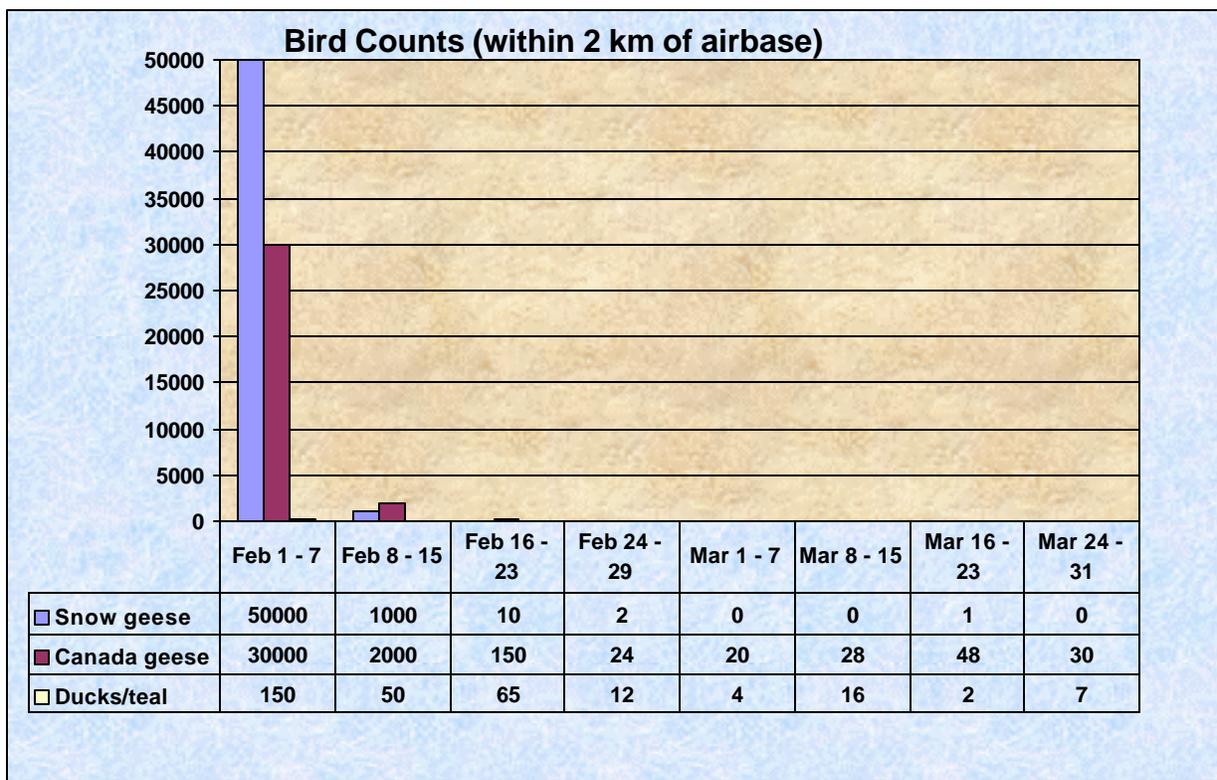
The results achieved by RSW and its Border collie are quite impressive considering some of the limitations of the management program. The Border collie is handled by airport operations agents and is only worked for two short periods during the day (once in the morning and once in the afternoon). Additionally, due to the presence of alligators, the dog is not allowed to work the large drainage swale south of the runway, where the majority of remaining birds congregate.

### **Dover Air Force Base**

On February 1, 2000, BCR began a wildlife control contract with the Dover Air Force Base. The Dover AFB contract called for a complete wildlife control program package, focused around the use of Border collies in wildlife harassment. Two-year results from BCR's program at Dover AFB are tremendously encouraging, as a substantial percentage of large birds has been excluded during this period from the airbase and the surrounding farmlands, an overall area encompassing roughly 46 km<sup>2</sup>. Total large bird numbers were reduced by more than 150,000 birds in the short initial 1-month period of February 1-28, 2000.

Dover Air Force Base is situated between three large wildlife refuges and along the eastern US migratory flyway. The base is surrounded by farmland and is less than 2 miles from the Atlantic Ocean, providing the perfect habitat for large migratory birds. A squadron of large C-5 Galaxy cargo planes operates out of Dover AFB and even though

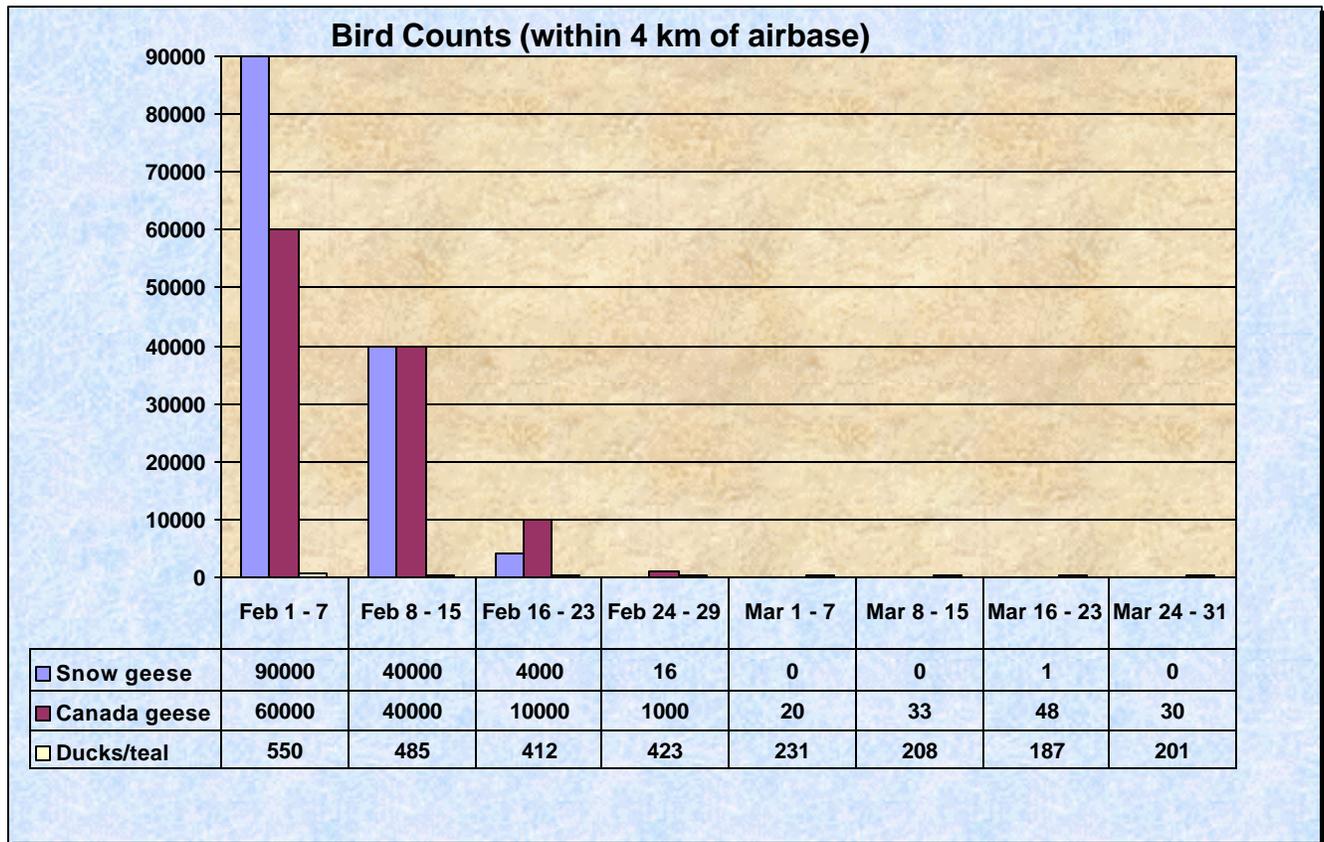
the planes are larger and slower than most military aircraft, bird strikes have posed a significant problem for the base. In two years prior to the initiation of the Border Collie program (1998-1999), collisions between birds and aircraft caused more than \$1.2 million in damage to Dover's C-5 fleet. The primary threats are large flocks of Canada geese (*Branta canadensis*), snow geese (*Chen caerulescens*), as well as smaller aggregates of ducks, teal and seagulls. Prior to the contract with BCR, all attempts to eliminate birds from the surrounding environment were unfruitful. Pyrotechnic usage was unproductive and an organized hunt of Canada geese resulted in a public relations nightmare for the airbase (as well as resulting in no overall change in bird presence). Geese are the most critical concern for aircraft operations at Dover AFB and large flocks of the birds (100 – 20,000 individuals) congregate just outside of the base perimeter fence in the cultivated fields of neighboring farms. At the initiation of the Border collie program, weekly bird counts totaled more than 50,000 snow geese and 30,000 Canada geese within 2 kilometers of the airbase (Figure 3). By the end of the second week, weekly bird counts for the geese within the 2-kilometer radius dropped to a combined total (Canada geese and snow geese) of just over 20 individual birds. Overall counts within a 4-km radius dropped markedly but remained



**Figure 3: Weekly bird counts for Dover AFB within 2 km of the base perimeter fence after the initiation on Feb. 1, 2000 of a wildlife control program utilizing harassment by a Border collie.**

relatively high. The decrease in number could be directly attributed to the reduction in bird numbers within the 2 km radius. The area between 2 km and 4 km from the base however continued to exhibit large numbers of birds. At the end of the second week,

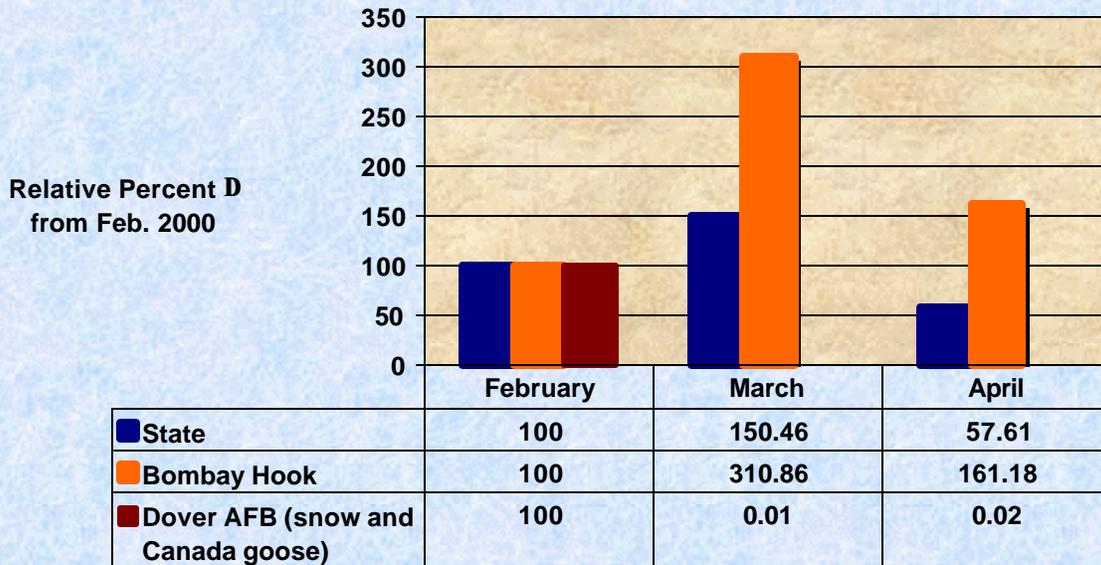
harassment efforts with the Border collie were extended to a 4-kilometer radius from the base (Figure 4). By the end of the month, the overall size of the area covered by the wildlife control program encompassed approximately 46 km<sup>2</sup> and total weekly large bird counts totaled 20 geese – a 99.9% reduction in bird numbers in a 1-month period. All of this was accomplished with one wildlife officer, a single Border collie, and a vehicle.



**Figure 4: Weekly bird counts for Dover AFB within 4 km of the base perimeter fence after the initiation on Feb. 1, 2000 of a wildlife control program utilizing harassment by a Border collie.**

At the same time that the bird numbers were decreasing so dramatically around Dover’s airfield, the number of geese (particularly snow geese) was still on the rise in the state of Delaware. During the initial month of BCR’s wildlife control program, figures from bird surveys by the Delaware Department of Natural Resources showed the number of snow geese in Delaware actually increased by 50.5% (while Dover AFB’s decreased by 99.9%). The number of geese at the nearest wildlife to Dover AFB, Bombay Hook (approximately 5-10 km away), shot up dramatically during this same time period – increasing by more than 310%. (Figure 5) This demonstrated that the severe reduction in the bird population around Dover AFB was not due to birds migrating out of the state, but simply leaving the area immediately surrounding the airbase (and going to the nearby wildlife refuge!). Also testament to this fact were the observations by pilots that noted large numbers of birds congregating just outside the Border collie-patrolled “zone”. Secondary field surveys verified these observations. Large flocks of geese remained just

## Relative Snow Goose Populations



**Figure 5: Relative percent change in snow goose populations in Delaware, as well as at Dover AFB and the nearest wildlife refuge, demonstrating that the initiation of the Border collie program was the causal factor of the decrease rather than migration of the birds from the area.**

at the periphery of the patrolled area and the only limitation of the range of the dog was the geographical restriction (most of the remaining area was within wildlife refuge boundaries) and time restrictions of patrolling such a large expanse of land. Reports from farmers within the patrolled area noted that the snow goose presence in 2000, coincident with the commencement of the Border collie program, was remarkably nonexistent. In 1999, several farmers had to plow under entire fields of wheat that were rendered unmarketable and were unable to be harvested due to the severe damage caused by snow geese. Though the long-term effect on the migratory populations of birds at Dover AFB remains to be seen, the initial 2-year results are impressive and encouraging and suggest a highly effective mechanism for Dover AFB to combat its bird strike problem.

### Israeli Air Force

For a three-month period in 2000, during the fall bird migration season in Israel, Border Collie Rescue conducted an experimental program to test the efficacy of utilizing Border collies for wildlife control at the Ramat David Air Force Base in northern Israel. In light of the results achieved during this short working time frame (and over two additional migration periods since the initial experiment), data compiled during these periods indicate that utilization of a Border collie can serve as a successful means for the Israeli Air Force to attenuate the bird strike threat at its airbases. The most important result of the program is obviously the bottom line – there were no damaging bird strikes to aircraft

using Ramat David AFB during any of the three-month periods, at the height of bird migration season in Israel. Millions of birds pass through Israel during these seasons, as they move from Europe and western Asia, south to the African continent, and back again. Moreover, the threat of a serious bird strike was greatly reduced by the elimination of larger birds from the airfield and a 3-km. radius outside the airbase, as well as the overall reduction of major bird populations on the AOA. All white storks (*Ciconia ciconia*), black storks (*Ciconia nigra*), pelicans (*Pelecanus onocrotalus*), great white egrets, grey herons, and black kites were excluded from the airfield and the farmlands and ponds surrounding the airbase by the use of the dog, even though thousands of birds passed through the area. Of these species, only white storks attempted to feed or forage on the airdrome and they were immediately excluded from the area by the Border collie and did not return. Additionally, the dog harassed any individuals found in the vicinity of the base, resulting in the birds vacating the area. This is a profound difference from the fall migration season prior to the arrival of the dog, when airfield wildlife personnel were unable to prevent storks and other birds from resting on the airfield, resulting in at least one severe bird strike and considerable damage to an F-16 aircraft.

The results of airfield bird counts also bear out the considerable effect the dog had on overall bird populations. From the commencement of the program in mid-September, there was a gradual decrease in overall bird numbers, until two extended periods of absence in which the dog did not work, where bird numbers rose back to their original levels. Even the absence of the dog during weekend periods was enough for some birds to return to the airfield in moderate numbers (particularly chukars (*Alectoris graecae*), plovers (*Hoplopterus spinosus*), and pigeons). Once the dog was removed from the environment, bird populations returned to their pre-harassment levels as they no longer felt threatened by the presence of a predator. Even continued conventional harassment techniques quickly lost their efficacy, as the birds rapidly became habituated to their use as they had been prior to the arrival of the dog. This demonstrates that it was the predatory nature of the Border collie that had the desired effect, not simply the presence of airfield personnel to harass wildlife. Bird harassment programs with a Border collie are generally long-term projects and must be maintained, like airfield-management programs, on a daily basis. Once the dog goes away, the birds will inevitably return soon thereafter, sometimes the very same day. The idea is generally to stay on top of the problem so airfields do not have to fight a major bird problem every other week.

### Large Migratory Birds

White Storks (*Ciconia ciconia*) were found near Ramat David AFB in the earlier portion of the three-month period (September), as their migratory season ended around the beginning of October. Several hundred individuals were successfully harassed from around the airfield by the Border collie over the three-month period but it was a group of one dozen storks that decided to remain in the immediate area instead of migrating that posed the most serious threat. They could often be found in mixed flocks with large numbers of Black Storks (*Ciconia nigra*) - another, much larger group of birds that had also decided to stop their migration and winter in Israel. The storks were harassed, along

with the black storks, and were eventually pushed to distances well out of reach of the airbase.

Though wildlife control personnel at the airbase had never spotted black storks (*Ciconia nigra*) in the region, at least one large flock of storks (about 300 individuals) was spotted in the Ramat David AFB environment during the three-month period (and the subsequent year). At first the storks were located very close to the airbase's perimeter fence (approximately 100 m from the fence), foraging and loafing in the fields just at the end of the runway. Three days of harassment by the dog excluded the birds from the area near the runway and it wasn't until two weeks later when the storks were once again discovered, on the ever-widening wildlife patrols, at a fishpond approximately 1.5 km from the airbase. Since this was still too close to the airbase for flight safety, the birds were dispersed from the area by the Border collie. Harassment continued, as relocation efforts did initially, for 3 days until the birds decided to permanently relocate to an area well out of reach of the airbase.

It soon became obvious that this large group of storks had decided to overwinter in Israel but were prevented from staying in the immediate vicinity of the airfield by the presence of the dog. In the final month, the group of storks was seen each evening returning from an area dozens of kilometers north of Ramat David AFB, flying past the western part of the airfield, to an area well south of the base. Quite simply, the birds were everywhere in the area except near the airbase. They flew great distances each day to forage north of the airfield and then return to roost for the evening well south of the base, in order to avoid any further encounters with the dog. The area around the airfield was obviously attractive to them (as they attempted to use it in the earlier part of the experiment) but they refused to take advantage of the habitat near the airfield after several harassment events by the Border collie. Even though they passed through the area twice each day, the storks declined to stop, for fear of encountering the dog.

Most instances of encounters with White Pelicans (*Pelecanus onocrotalus*) were with immense flocks of the birds that were spotted over and around the airfield, migrating through the area. Group size was oftentimes considerable (approximately 15,000 individuals) but more frequently was much smaller (several hundred individuals). There was a single instance during the three-month period in which pelicans actually were found in the immediate vicinity of the airfield, around the middle of October. A group of approximately 500 individual pelicans was spotted in the farm field just north of one of the main runways, approximately 30 meters from the perimeter fence and directly in the flightpath of aircraft using the runway. The Control Tower was notified and the Border collie was used to harass the birds. They quickly vacated the premises and flew out of range and were not spotted again. In their haste to gain altitude quickly, many birds regurgitated their meals to lighten the load, resulting in fish being found on several runways.

Overall, it was the successful harassment of the large white storks, black storks, and pelicans that represented the preeminent achievement for the Border collie during the three months. These 3 species pose the greatest threat to aviation activity at Ramat David

AFB during the migratory season and their exclusion from the airfield environment represents a significant reduction in a potential birdstrike hazard.

In establishing the potential threat posed by the large migratory bird populations, the bird's mass plays a large part in the determination. The force of a bird striking an aircraft is dependent on the velocity of the aircraft (the speed of the bird is generally much smaller) and the mass of the bird. The equation  $e=1/2mv^2$ , where the resultant force imparted to the aircraft is one-half of the mass of the bird times the velocity at impact squared, represents the potential damage that a bird can inflict on an aircraft. As an example, a 12-lb. goose striking a plane traveling at roughly 150 mph at takeoff results in collision equaling more than 1.5-million foot pounds of energy - a force equal to an elephant stampeding over a parked car. There could be 200 separate birdstrikes involving single sparrows, starlings, or larks but the damage that they are likely to inflict to aircraft at Ramat David AFB is relatively insignificant. A single birdstrike involving a large white stork, on the other hand, could wreak havoc on a small F-16 fighter aircraft, costing hundreds of thousands of dollars to repair and potentially risking the lives of the crew onboard. Concentrating efforts on eliminating the presence of 50 swallows, for example, scattered throughout the airfield may not be as important as focusing on removing a lone stork in the fields near the runway. The four storks that caused the serious and nearly catastrophic F-16 accident prior to the dog's arrival are testament to this fact. Even if the Border collie had no effect on any other bird or wildlife species on the airfield, the successful harassment of the three large migratory bird species can justify the existence of the program and the accomplishment of the three-month experiment.

#### Resident Birds – An Example

Two of the most problematic species on the airfield, due to their inefficient flight characteristics and their tendency to nest near the runways are the Spur-winged Plover (*Hoplopterus spinosus*) and Stone Curlew (*Burhinus oedicnemus*). The plovers and curlews spend most of their time near the stone borders of the tarmac, as well as in the short grass on the airfield. They are poor flyers and are not threatened by air traffic, vehicular traffic, or even people approaching on foot. Wildlife personnel at Ramat David AFB have noted times when plovers have actually challenged aircraft taxiing down runways or preparing for takeoff. Many plover nests have been noted on the airfield, most within meters of active taxiways and runways. Fewer curlew nests have been discovered on the AOA, though they are a bit larger and nest in the same proximity to the tarmac as plovers.

Before the experimental phase with the dog, attempts to remove plovers and curlews from the airfield by traditional harassment techniques were generally unproductive. The birds would not fly off with the utilization of pyrotechnics and even direct attempts to move the birds by physically approaching the birds were unsuccessful. At most, wildlife personnel noted that the birds would fly short distances (2 – 20 meters) and settle back onto the airfield. With the frustration of harassing these birds, the normal routine would be to note the location of their nests and to leave the birds alone.

All that changed however with the utilization of the Border collie. The numbers of plovers on the airfield dropped quite dramatically and they returned only infrequently to “test the waters” to ensure that the dog was still around (Figure 6). The only plovers that were discovered on the base during most of the three-month period were located approximately 1 - 2 meters from the perimeter fence on the south side of the airfield.

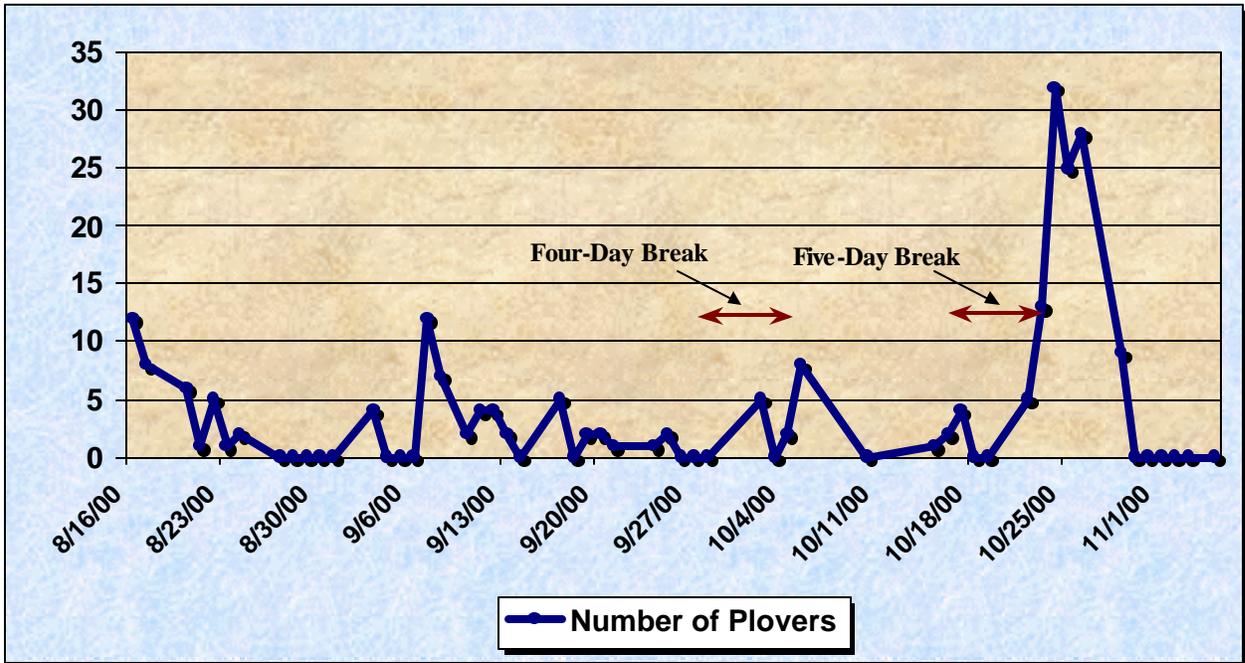


Figure 6: Spur-winged plover numbers during the three-month usage of a Border collie at Ramat David AFB. Note the two peak increases coincident with extended absences of the dog.

Hundreds of plovers could be seen just outside the airbase perimeter fence in the surrounding fields and roads but only the occasional individual or pair would wander onto the base – though never farther than the perimeter road. This kept them well away from aircraft operations at all times and since they do not fly at great heights, they were not harassed outside of the base. Ironically, when the plovers would fly onto the airbase along the perimeter fence, they would settle around and together with the guard dogs, showing no fear of the dogs or hesitation in walking in very close proximity to the dogs. However, at the sight of the Border collie, the birds would immediately vacate the premises and fly back outside the perimeter fence to safer locations. Though they might have been standing right next to a guard dog (less than 1 meter away), they would flee if they could visually spot the Border collie more than 20 meters away. This shows that the birds were conditioned to respond to the Border collie in particular and did not generalize their behavior to all dogs, but rather, only the one that posed a threat to them on the airfield. The guard dogs could not be counted on to harass the plovers at all, particularly since they had been habituated to the presence of crows feeding on their dog food.

After two extended breaks near the end of the experiment, when the dog was absent from the airfield for several days, the plovers and curlews returned en masse. After the second

extended break, dozens of the birds were spotted on the AOA – this time in close proximity to the runways. After several days of harassment by the dog, the plover and curlew populations once again came under control and the birds were principally excluded from the airfield. Though utilization of the dog is not a permanent solution (if the dog is removed, the birds return), it is clear that harassment with the dog appears to be a highly effective means of reducing plover and curlew populations on the AOA.

Percentage of Birds on Airfield

Of practical importance is the determination of the percentage of birds spotted on the airfield itself versus in transition over the airfield. As wildlife control efforts concentrate on those birds that tend to rest, feed, or nest on the airfield itself and very little can be done with birds flying overhead, the amount of birds actively remaining on the airfield itself is a primary indicator of the effectiveness of overall wildlife control efforts. The data reflects the percentage of birds on the airfield, rather than an absolute population number, because of the change in population numbers over time. If, for example, a particular species is migrating through the area, their absolute numbers may rise and fall simply due to their movement through the area but would not reflect the effectiveness of the dog in reducing the bird hazard. If the numbers of birds on the airfield relative to the numbers of birds in the area falls, then this is a direct indication of the effect of the dog, without the worry of bias in fluctuating population numbers. As an important side note, populations of large migrating birds, (eg. the enormous flocks of pelicans or storks passing through the area), were **not** included in the counts and therefore did not skew the percentage because of their overwhelming numbers.

Overall, the number of birds spotted on the ground gradually declined over the months. (Figure 7) Some days, very few birds at all were actually found on the airfield itself, and

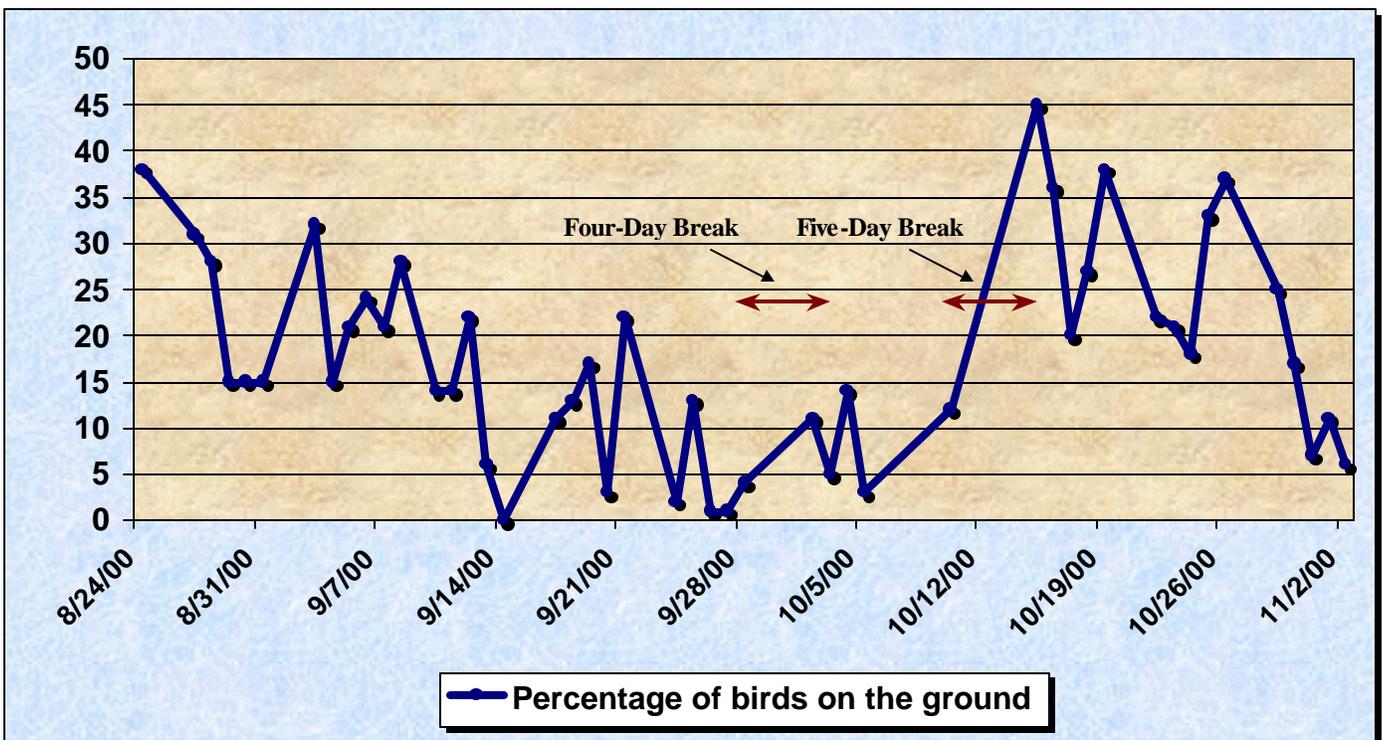


Figure 7: Overall percentage of birds located on the ground versus transitioning in the air through the airbase at Ramat David AFB. Again, note the two peak increases, coincident with extended absences of the dog.

generally their numbers may only have been represented by a small number of groups and the occasional individual. Overall, the dog had a dramatic effect on the bird populations on the airdrome. Though birds continued to transition through the area near the runways and taxiways, they did not forage and loaf in the fields or vegetation adjacent to aircraft movement areas. This meant that they were spending substantially less time in the vicinity of the runways, resulting in a dramatic reduction in the potential for aircraft/bird collisions. Unfortunately, the habitat of the airfield at Ramat David AFB requires significant improvement if the total number of birds (including those transitioning between locations) are ultimately to be reduced. As long as prime habitat for the birds remains on the airbase, the birds will persist in significant numbers and continue to transition to and from these locations.

Again, as with plovers, the two extended absences of the dog resulted in dramatic upswings in the population counts, as birds returned to the airfield, feeling that it was safe to return. It took the final 2 weeks to return the percentage to the lower levels achieved by the dog prior to the absences from the airfield.

### **Cold Lake Air Force Base**

Mammal and avian hazards present a significant risk to aircraft at Four Wing Cold Lake in Alberta, Canada. Located 280 kilometers northeast of Edmonton, the 2366-acre remote base is home to a variety of wildlife ranging from black bears (*Ursus americanus*) to migratory geese. The base is encircled by rivers on three sides, with a residential neighborhood on the fourth side. Habitat on the base is ideal for wildlife, with wooded areas or wild grasses in all unoccupied areas of the base.

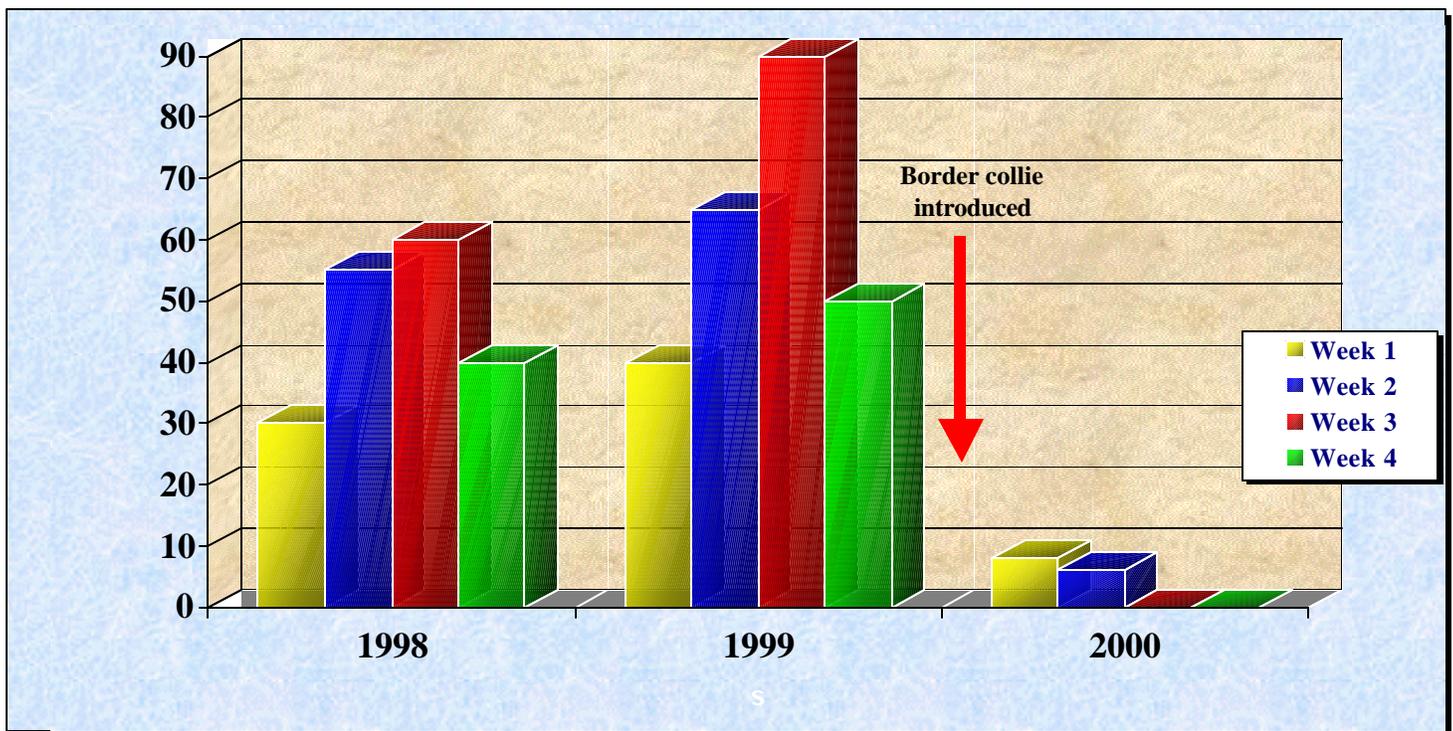
White-tailed deer (*Odocoileus virginianus*) are the species of greatest concern at Cold Lake AFB. Four wooded areas that total approximately 124 acres provide abundant cover and browse habitat. Deer are primarily active at night and frequently cross runways as they transition between wooded areas. It is estimated that 25-30 deer reside on the base annually. There is very little immigration or emigration, with open gates or occasion holes in the perimeter fence providing the only opportunity for the deer to move between the airbase and outside. Options for harassing the deer have been limited; depredation, habitat alteration, and round-ups have all been dismissed based on public relations concerns. Techniques that have been used include pyrotechnics, chasing with a vehicle, and intercept baiting. These methods have met with limited success and it is estimated that runway incursions did not significantly change with any of these techniques.

In August 2000, a Border collie joined the wildlife management team at Cold Lake AFB. The Border collie spent his initial two months getting accustomed to his new environment and training with his new handler. By November, the dog was being used full-time to harass deer deeper into the woods and away from the airfield.

Counts conducted by control tower personnel and the wildlife control officer showed a dramatic reduction of runway incursions by deer after employment of the dog -- from a weekly average of 45 runway incursions per week in 1998, and 61.25 per week in 1999,

to 3.5 per week after the introduction of the dog in 2000. Since Cold Lake AFB is under a continual snow cover during the late fall and winter, all incursions were accounted for, even during nighttime hours, as deer tracks were also studied in order to accurately determine runway incursions. Each track was counted and then cleared from the snow in order to avoid double counts.

Moreover there have been no runway incursions by deer since the second week of November 2000, a period of more than 10 months as of the date of this publication. Deer sightings on the airfield are also down significantly. Very few deer have been spotted on the base itself and most sightings have been well away from the AOA in the deeper portions of the woods. Though it is uncertain whether the deer have vacated the airfield itself, minimally they have remained well clear of the runways and taxiways.



**Figure 8: Observed November deer runway incursions at Cold Lake AFB before and after the introduction of a single Border collie.**

Before use of the Border collie, the deer were harassed by “hand” with a person walking through the areas. While this was effective in pushing the deer back temporarily, they usually returned within 24 hours. On the other hand, the dog discourages the deer from returning for weeks to months at a time. In fact, outside the fall rut, maintenance walks only need to be performed every couple of weeks with the Border collie.

Additionally, the number of birdstrikes is down. There have only been two birdstrikes since the dog was employed (approximately one year in total), neither of which caused any damage to aircraft. During Maple Flag, a large NATO air exercise at Cold Lake AFB, where more than 300 movements a day take place, not a single birdstrike was

recorded – something that cannot be said about Maple Flag exercises in previous years. Pyrotechnic usage is also down quite significantly, with airfield personnel recording a 40 percent reduction in overall usage. Wild canid populations on the airbase are also down, though it is uncertain whether the presence of the Border collie is directly responsible for this decline or simply the decrease in available food sources as bird numbers have also been reduced by the dog.

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For copies of the complete report by KLECE for Southwest Florida International Airport, please contact Ms. Jami McCormick, Office of Planning, at (941) 768-4326 or [<jmccormick@swfia.com>](mailto:jmccormick@swfia.com)

For continually updated bird count and strike data from Dover AFB or for more information on Border Collie Rescue's Birdstrike Control Program, visit <http://birdstrike.bcrescue.org>

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Above: “Fly” the Border collie patrols the airfield at Dover AFB in Dover, Delaware. Thousands of snow geese and Canada geese used to frequent the area in and around the airfield before her arrival.

Below: A near catastrophic birdstrike with an F-16 at Ramat David AFB resulted in the plane crashing through the safety net, engine loss, and more than a million dollars in damage. (Inset): the storks that collided with the aircraft.





Above: “Sky” and “Fleet”, two Border collies currently working at Vancouver International Airport in British Columbia, Canada.

Below: “Sam” (Surface-to-Air Missile) the Border collie helps keep the F-18 aircraft operations at Cold Lake AFB safe from deer and bird hazards.





**Above: “Shadow” the Border collie keeps the runways at Ramat David AFB in northern Israel clear of birds for the large contingent of F-16s stationed at the airfield.**

**Below: Chasing a black-headed heron at Durban International Airport in South Africa. Border collies can be used to harass all types of birds – from small species such as larks, plovers, and pigeons to the largest species of birds - including herons, swans, and cranes. (Photo courtesy Albert Froneman)**

