

## BALD EAGLES AND BIRD STRIKES

Conditions on November 14, 2005 were ideal for cobweb cleaning – cool, calm, ceiling and visibly unlimited. My log book entry indicates that I completed the tasks at hand:

Cessna - 172      GIFM      Self      ZBB - XX-ILS/NDB - CW- PK - Hold - ZBB

Sun, Fresh Snow, Traffic +4, Eagles X2      2.2 hrs



The last cryptic remark – Eagles X2 – implies that all did not go according to plan. After several circuits at Chilliwack I climbed west towards Pitt Meadows. In cruise attitude at 2500 feet ASL just east of Hatzic Lake, my scan picked up an oblong object at 10 o'clock and two-thirds up the windscreen. Head movement ruled out insect debris. Lack of relative motion and gradual size enlargement reeked of collision threat. Seconds ticked by. A sense of unease pervaded the cockpit. Still identification was elusive – aircraft or helicopter? Then I detected a fluttering along the upper wing surfaces – feathers! Immediate right descending turn. The unidentified object blossomed into a mature bald eagle in attack posture – wings stalled, talons extended, unblinking eyes, as it flashed

just overhead. Glancing up I observed the mate soaring gracefully, oblivious to the pandemonium below.

After regaining my composure and control of the aircraft, I continued en route to Pitt mulling over this encounter. It occurred to me that this interception was not accidental and had been in progress for some time before I was aware. My time estimate from first sighting to evasive maneuver was 4-5 seconds. I shudder to think of the outcome if my head was buried in my Canadian Flight Supplement confirming the A.T.F. for Fort Langley. Trajectory would have been above the propeller arc and impact at head level – akin to a 20 mm cannon shell in plumage. I was left with the uneasy inclination that I had been the intended prey. I put this incident out of my mind until I was informed of a similar encounter in the course of an aviation medical examination.

On December 18, 2005, Kyleen Stanton, an instructor with Coastal Pacific Aviation, was pilot-in-command of a mountain cross-country check ride with two commercial students. The route was round-robin from home base Abbotsford to Pemberton with a pilot flying exchange during the stop over. They were flying a company Cessna 172, GIXQ. Weather was clear for the late afternoon flight. Progress was uneventful outbound to the mid point of Stave Lake. They were in cruise flight at 3000 feet AGL when without warning, a mature bald eagle appeared in the left lower quadrant and climbed directly into their flight path. Kyleen immediately took control and initiated an evading left turn. Despite this action, impact with the nose of the aircraft occurred. Time estimate from sighting to impact was several seconds.

On recovery, flight characteristics of IXQ were normal but the cockpit quickly filled with the

odor of burning flesh and feathers. A glance at the oil temperature gauge revealed the needle at the red line. Despite this, the engine ran smoothly. Course reversal was completed and the flight plan amended to return directly to home base – with constant vigilance for suitable fields for an off airport landing in the event of an engine failure or fire. The landing and taxiing at Abbotsford were uneventful. It was only on post landing inspection that the damage incurred by this strike was appreciated: smashed landing light and cowling, loosened alternator mounts and dented propeller spinner. The initial estimate for repairs was \$4-5000.



Cessna - 172, C1XQ - December 18, 2005 - Bald Eagle Strike. Photo courtesy Wayne Cave



Cessna - 172, GIXQ - December 18, 2005 - Bald Eagle Strike. Photo courtesy Wayne Cave



Cessna - 172 , GIXQ - December 18,2005 - Bald Eagle Strike. Photo courtesy Wayne Cave

It was obvious that the eagle did not survive. I have my suspicions that this was the same bird that had attempted to intercept me. Proof is impossible. Unfortunately, a bird strike is not always such a lopsided affair.

In the early 1970s, a Cessna 180 floatplane operated by the Russell and Lilly Logging Company was circling to land near Gibsons on B.C.'s sunshine coast. On board were the commercial pilot and company owners. At low level, the aircraft abruptly departed controlled flight and spiraled to the ground – there were no survivors. During the ensuing recovery, investigators discovered the remains of a bald eagle in the cockpit. It was apparent that an in flight collision had resulted in pilot incapacitation at an unrecoverable altitude.

Ron Pare, a retired Air Canada captain, recalls two bird encounters that exemplify the law of intensity.

In 1965 he was at the controls of a float equipped Cessna 180 in cruise at 6000 feet AGL near Sullivan Bay, BC. His scan picked up converging traffic: frontal and above the horizon. This rapidly materialized into an adult bald eagle in attack posture. Evasive action was required to avoid a mid air collision. Ron interpreted this as territorial behaviour with the egotistical mindset of raptor at the apex of the food chain: You are invading my air space – Leave!

Later in his career in the early 1970s he was the first officer of an Air Canada DC-8 passenger flight departing Calgary for San Francisco. Ceiling was 500 feet overcast. Takeoff roll and rotation appeared uneventful from the flight deck. Shortly after entering cloud, the tower

controller queried their status. The crew reported no problems. The controller came back with the chilling tidbit that #3 engine was spewing flame before they vanished into the clag. The emergency landing at Calgary was performed flawlessly without further damage, injury or loss of life. Post incident investigation revealed that one or two hawks had been ingested by the engine, eviscerating the major components transforming it into a blow torch – no vibration and the crew was oblivious to its precarious situation. Alert ATC personnel and air crew discipline averted disaster. Lady Luck did not abandon this flight. Later examples will demonstrate that she was not always so benevolent.

Until the first two incidents, my cumulative knowledge of these magnificent raptors was limited to that gleaned from a Port Hardy cabbie: They reach maturity at five years, acquiring the characteristic white head and tail feathers. They mate for life.

In order to answer my question of their aggressive behaviour towards aircraft, I had to search out higher authority. David Hancock, the renowned BC biologist, proved the ideal resource. His doctorate thesis at U.B.C. studied the nesting habits of this bird. He is the author of “The Bald Eagle of Alaska, B.C. and Washington”. He has dedicated 50 years to the study of its nesting ritual and migratory routes. In this reader friendly publication he summarizes the results of his research, sprinkled with personal vignettes and spectacular photographs. My knowledge base expanded exponentially.

The bald eagle can be described as a gregarious scavenger with a passion for travel. One fall morning David enumerated 1460 eagles on the banks of the Harrison River – gathered to feast on the

spent salmon carcasses. During the course of the day, there was a progressive thermal ascent to 3-5000 feet. Intriguingly, one third drifted south towards the Skagit River in Washington State, another third westward towards Surrey and Boundary Bay and the last group climbed higher disappearing over the mountains towards Squamish. It is a sobering thought – 1000 eagles soaring through the air space adjacent to Chilliwack, Abbotsford, Pitt Meadows, Langley, Boundary Bay and Vancouver Airports! A pilot encountering this soaring gaggle of eagles would be hard-pressed to escape unscathed – eagle roulette!



Eagles use thermals to soar looking for new food sources and then glide to new ones. They can travel 200 to 300 miles in a day.  
Photo courtesy David Hancock.

A recent research project of the U.S. Fisheries and Wildlife Services, with eagles wearing backpack transmitters and GPS tracking followed the movements of an adult pair in the Skagit River Valley of Washington State. The day after chick abandonment the female was plotted north to Surrey, BC, east along the US border to Alberta and north to Lesser Slave Lake. The distance covered in one day was a phenomenal 500 miles! The male headed north and by the third day was in Prince Rupert – averaging a paltry 200 miles per day. With this in mind, it is quite possible that a

single rogue bald eagle could patrol the 10-15 miles between Hatzic and Stave Lakes. In my discussion with David he could not recollect an aggressive encounter with a bald eagle on his fixed wing aircraft. This takes into account his 1500 hours as a private fixed wing pilot, many in close quarters with “Baldy” while surveying nests.

My investigative search gained momentum with a call to Bruce McKinnon, Transport Canada’s Wildlife specialist. He is the editor of “Sharing the Skies: An Aviation Industry Guide to the Management of Wildlife Hazards”. This publication proved to be a veritable encyclopedia on wildlife encounters in aviation. It has widespread application from community leaders to waste disposal companies. Chapter 10 – “Solutions – Pilots” is a must read. The section on Flight Planning and Operating Principles covers strategy to minimize risk and initiatives to take in the event of a bird strike. One statement in particular caught my attention: “Birds of prey have been reported to attack aircraft”. – *Q.E.D.!* This strengthens my suspicion that my introductory vignettes were not chance encounters but hunter – prey scenarios with the aircraft fulfilling the role of prey!

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*Comment by David Hancock, Pilot / Biologist – I think this is carrying fantasy a little far. Play, or even perceived defense of their nesting territory – and most of the incidents described above are not defense of territory, nor are they examples of “an eagle hunting an aircraft”. Your implication of the aircraft as prey is simply not true. If they wanted to do that, on a fanatical suicide mission, there would most certainly be no planes. Eagles love to soar on the wind, they develop aerial skills by chasing and joy riding to display and improve their life giving aerial talents. It was this admiration of falcon and eagle flight skills that made me want to fly. Certainly here on the west coast, particularly along the Pacific Flyway where there are more waterfowl and raptors than*

*almost anywhere in North America, it behooves pilots intruding the birds airspace to be vigilant for them. I am always surprised that the millions of waterfowl and gulls result in so few impacts.*

*The interpretation that an eagle, in close proximity to an aircraft, particularly on a collision course, has it legs out is to be interpreted as aggressive is simply misunderstanding eagles behavior. It is similar to the earlier comment I made about people misunderstanding why eagles lock talons and come tumbling earthward. As any pilot can understand any two aircraft coming from different directions and locking wheels are likely to have some airfoil disruption! If now you are a pursued eagle, one who has another eagle bearing down on you in hot pursuit, probably because you are in a neighbors territory – or maybe just in exuberant play –, and the pursuer is about to put his talons in your back what do you do? Only one thing. You do a roll and throw your talons up to meet those of the aggressor – the cartwheel is the obvious outcome. Now take the eagle soaring lazily on a thermal, probably watching for food or playing on the wind, and along comes an aircraft on a collision course – and coming very fast!! What does the eagle do? If it can't readily evade and if a collision is possibly imminent a logical maneuver I would suggest is to put up your only defense – instinctively you raise your hands to ward off a blow – sorry that was to be the eagle warding off the blow so it puts up its talons. Attack or defense mode? You call it.*

*When I drive I worry about cars going off track, a drunk or incompetent driver doing the unpredictable, mechanical failure or something falling off a passing vehicle. In the air I add in the real potential hazard of hitting a bird – and I try and watch more carefully. If you are really concerned, and you should be, then reduce your flying in the major bird migration routes and times.*

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Chapter 6 – “Airports” provided more food for thought. The diagram of hazardous zones adjacent to an airport indicates that extremely hazardous sites such as garbage dumps and food waste

landfill locations should be no closer than 8 km radius from the airport reference point. My home base, Boundary Bay, is sandwiched between Mud Bay to the south and a landfill site and pond just north of the circuit. Rare is the day that the adjacent airspace is not humming with transiting seagulls, ducks, and great blue herons as soaring hawks and bald eagles compete for a sequence in the circuit – a recipe for disaster!

Chapter 13 – “Solutions for Military Aviation Experience” provides sobering statistics of serious accidents with aircrew and civilian fatalities associated with bird related encounters. Between 1950 and 1999 there were 353 serious accidents with 165 fatalities (148 aircrew, 17 persons on the ground). The tabulation of jet aircraft lost by military forces in Europe and the United Kingdom filled eight mind-numbing pages with engine failures outnumbering windscreen penetrations. This included the loss of eight Canadian Forces CF-104 Starfighters.

Three military accidents highlight the serious consequences of a bird strike.

On September 28, 1987, a USAF B-1B Bomber was training on a low-level bombing range. At 600 feet AGL and 560 KIAS it collided with a 15 pound white pelican. The ensuing fire resulted in hydraulic failure and loss of control. Three crew ejected and three perished with the loss of their \$200 million aircraft. Subsequent investigation revealed that the route had a history of repeated bird strikes and was dangerously close to reservoirs favoured by pelicans. In addition, the aircraft was not designed to tolerate a major bird strike.



Rockwell International B-1B. On September 28, 1987 a B-1B was lost in a collision with an American White Pelican while on a low-level mission in Colorado. Three crew members died. Photo courtesy Denis Cloutier.



**Plate 8** This is all that remains of a \$200 million USAF B1-B bomber that crashed after striking an American White Pelican in Colorado. The airplane weighed 185,000 lbs, the bird 15 lbs. Three crew members died in the crash. Photo courtesy Transport Canada.

On September 22, 1995, a fully loaded USAF E-3B AWACS (military version of the Boeing 707) departed Elmendorf Air Force Base, Alaska on a training flight. The tower air traffic controller observed a flock of geese near the runway but failed to notify the aircrew. At the point of lift-off the aircraft struck at least 31 birds resulting in loss of power from the two left engines. Out of control, the aircraft rolled left and crashed with the loss of all 24 crew. Investigators faulted ATC for not warning the crew, and the crew for lack of concern with a moderate bird-watch condition in effect. In addition, flying operations personnel were blamed for not instituting an aggressive bird management program recommended two months previously when dangers posed by the resident Canada goose population was identified.



E-3B AWACS. The USAF has lost only one of these aircraft, and that was due to a bird strike on September 22, 1995 at Elmendorf AFB, Alaska. Photo courtesy Denis Cloutier.



**Plate 1** On September 22, 1995 a 4-engine USAF E-3B AWACS crashed 43 seconds after takeoff from Elmendorf AFB, Alaska. The aircraft struck a large flock of Canada Geese that had often been observed in the area. Photo courtesy Transport Canada.



**Plate 2** Canada Geese on the runway shortly after the September 22 AWACS crash. Twenty-four crew members died in the crash. Photo courtesy Transport Canada

On July 15, 1996, a Belgian Air Force C-130H Hercules crashed after a massive bird strike on short final at the Dutch Air Force base at Eindhoven, Holland. Failure of three engines resulted in the port wing striking the ground beside the runway, rupturing fuel tanks and starting an immediate fuel fire in the forward fuselage. All 41 on board survived the initial crash. The flight crew endeavored to extinguish the fires and rescue the passengers but were thwarted by rear fuselage doors jammed by impact. The duty air traffic controller was aware of a significant number of passengers on board but failed to notify the fire brigade that was in the process of extinguishing engine fires. Thirty-six precious minutes after the crash and 29 minutes after the main fire was extinguished, the rear door was forced open to discover 31 dead from toxic fumes with three to succumb later – total fatalities, 34.



AC-139 Hercules, similar to the aircraft that crashed as a result of a bird strike at Eindhoven AFB in Holland on July 15, 1996; 34 lives were lost. Photo courtesy Denis Cloutier.



Plate 17 Thirty-four people died in the bird-strike related crash of this C-130H at Eindhoven AFB, Holland onn July 15, 1996.  
Photo courtesy Transport Canada

These three accidents exemplify the catastrophic potential of a bird strike – even to a multi-engine, turboprop or jet. It is noteworthy that in each of these, the accident may have been prevented or fatalities reduced with alternate routing or improved communication between ATC, flight crew and fire/rescue personnel.

The effect of a bird strike can run the spectrum from an insignificant stain to catastrophe with structural/systems failure, engine failure or windscreen penetration and pilot incapacitation – the

proverbial feather sandwich. Many factors determine the severity of a strike with impact force topping the list. This force is directly proportional to the bird mass and SQUARE of impact speed. i.e. doubling air speed from 100 to 200 knots quadruples impact force and at 400 knots there is a 16-fold increase in the destructive potential. This explains the rationale of the Canadian Aviation Regulation limiting air speed to 250 knots or less below 10,000 feet MSL. Lower air speeds allow more time to see and avoid for both pilot and fowl and in the event of a strike, less destructive potential.

The majority of bird encounters occur below 3000 feet AGL with higher strikes involving larger species and greater potential for catastrophic damage. The highest recorded FAA bird strike occurred on October 23, 1991 – Species unspecified, struck by a DC-8-62, altitude 39,000 feet! Birds obviously do not suffer from hypoxia at high altitudes as we meek humans.

Bald eagles are the largest species sharing our air space with the Canada Geese running a close second. The mature eagle weighs in at 8 to 14 pounds and the goose 7.3 to 13.8 pounds. The female bald eagle tends to outweigh the male. Their laid back lifestyle of towering, soaring and gliding will often bring them into our cruising altitudes. It is noteworthy that both Kyleen and myself had our encounters in cruise flight. The colour plates in “Sharing the Skies” provide sobering insight into the catastrophic sequelae following a bird strike. After viewing the photographs of a Bell Jetranger following a collision with a western grebe, I will never denigrate a chopper pilot for wearing a crash helmet.



**Plate 5** An impact with a Western Grebe (3 lbs) caused considerable damage to this helicopter. The bird struck the pilot in the face.  
Photo courtesy Transport Canada.



**Plate 7** The helmet and face-shield probably saved the life of the pilot when he was struck in the face by windshield and bird debris.  
Photo courtesy Transport Canada.

While researching this article, one of my patients, a retired biologist, provided additional ammunition. He recounted a helicopter crash that occurred in the BC Interior that was fatal for the commercial pilot and two wildlife biologist passengers. Investigators attributed cause to collision with a bald eagle. In discussion with David Hancock, he could not recollect an aggressive act by a bald eagle while piloting a fixed wing aircraft. On the other hand, he had numerous aggressive encounters as a helicopter passenger while circuiting eagle nests.

The repercussions of a bird strike can be sudden and incapacitating. Retired Wing Commander Syd Burrows gives vivid example in Chick Childerhose's captivating book "Wild Blue".

On FRIDAY, September 13, 1954, Flying Officer Syd Burrows, a flight commander on 434 Fighter Squadron, was flying a Sabre 5 in a four aircraft section on a mock low level strike on their home base – Zweibrucken. Their squadron had been temporarily deployed to Baden-Soelingen pending runway repairs at Zwei. Conditions that morning were ideal sunshine and the flight was uneventful until just after the low level strike as the section was reconfiguring to battle formation. At 500 feet AGL cruising at 400 Kts, with minimal warning, Syd's aircraft struck a hawk. The canopy exploded with a blast of wind and plexiglass into his face. Blinded by blood and trauma to his left eye, he transmitted "MAYDAY" to warn his section mates. As vision gradually returned to his right eye, he suppressed the urge to eject. The funnel effect of his helmet and oxygen mask repeatedly filled his right eye socket with blood. The solution was to remove both and hunching down behind the bulletproof glass and positioning his head in the slipstream, he could redirect the blood flow away from his good eye. Fighting to maintain consciousness, he was able to formate on his wingman for the low level return leg to Baden. Fearing loss of visual contact, he carried out a

non-standard right break in order to keep the runway in sight. After a slight bounce, braking to decelerate, Syd pulled off at the first intersection and shut down. First on the scene was Chief OPS Officer, Wingco Jack Allen. On clambering up on the wing and viewing the macabre scene in the cockpit, he pronounced – “Jesus Christ!”



F/O Syd Burrows - Blinded at 400 knots September 13, 1954. Painting by Robert Bailey

For his resourcefulness and cool reaction under extreme conditions, Syd was awarded the Air Force Cross. His actions saved his aircraft and quite possibly his life. Plastic surgery minimized the scarring but retinal damage resulted in permanent loss of vision in his left eye. This resulted in loss of his flying status but Syd persevered accumulating 1000 dual hours in T-33's. In 1968 after a stint at Central Flying School, he regained his flying status and continued to pilot multi-engine aircraft such as the Dakota. After returning to Comox in 1983, he continued to fly as a private pilot. At age 75 he has the distinction of being Canada's oldest monocular pilot! – Quite an accomplishment after a near fatal bird strike.



LCOL Syd Burrows, AFC CD, RCAF SPAADS Reunion 1988 - Comox, BC

Prior to my introductory vignettes, I had always believed that a bird strike was similar to a mid air collision – an accident. After these incidents, I suspect that some bird strikes are the result of aggressive or predatory behaviour by certain species of raptor – especially the bald eagle. Perhaps it is a territorial trait. It makes one wonder if any of the missing aircraft along the rugged B.C. Coast are victim of an eagle encounter – Food for thought. This is one time when it may be acceptable to fantasize that you are a fighter pilot trying to avoid being bounced.

It is worth emphasizing that many bird strike accidents are preventable. No aircraft types are immune. A high-speed strike can foul-up your flight plan with aircraft damage or pilot incapacitation.

I regale the bald eagle as the orca of the sky. Both reside at the top of their food chain and have no natural predators. Never forget – BALD EAGLES FEAR NOTHING.

## References

1. The Bald Eagle of Alaska, BC and Washington by David Hancock
2. Sharing the Skies, Transport Canada
3. Wild Blue by Chick Childerhose