On January 15th 2009 US Airways flight 1549 started off just like any other. The Airbus A320-214 took off from New York LaGuardia airport (LGA) headed toward Charles Douglas Airport in Charlotte North Carolina. About two minutes into the flight the aircraft collided with a flock of Canada geese, lost all thrust, and was forced to make an emergency landing in the Hudson River.

At the time of the strike the aircraft was at about 2,800ft. Post crash analysis determined that in each engine one bird was sucked straight into the engine core with another traveling though the fan blades midspan. The birds that avoided the engine core caused relatively little damage now, don’t get me wrong they probably messed up the engine but none of the fan blades were broken off and there was no loss of engine containment. If those birds had been the only ones to enter the engines then things might have ended much differently. The other birds somehow managed to find their way into the center of each fan with a direct route to the core. Once in the core the now pulverized remains of the birds knocked out and fractured several of the low pressure compressor (LPC) inlet guide vanes (IGV) in each engine sending the metal fin fragments to tumble around the rest of the engine at high speeds causing irreparable damage.

The captain immediately noticed the bird strike and is recorded as having said “birds” on the cockpit voice recorder followed soon after by a terrible grinding noise. The pilots knew something had happened but they didn’t yet know the full extent of the damage. It
soon became apparent that they had lost all engine thrust so they began to go through the
dual engine failure checklist in a futile attempt to relight the engines. While this doing
this the pilots were simultaneously communicating with flight controllers trying to figure
out an emergency landing strategy. Initially they had decided to attempt a landing back at
LGA and had the runways cleared but then decided they did not have enough altitude to
ensure they could safely glide back to the runway. After then checking the possibility of
landing at any other runway (Teterboro Airport located in New Jersey), the captain made
the decision to ditch the aircraft (land under control in water) in the Hudson River.

The pilots then had to simultaneously glide the fully loaded plane in for a near perfect
landing on water while trying to restart the engines. Had the glide angle or pitch of the
plane been off by too much the craft would have broken apart upon contact with the
water, with engines this would be a much easier landing. Miraculously the plane came to
rest in the Hudson relatively intact and only two of the 150 passengers receiving serious
injuries. The plane was then evacuated with all passengers getting into the life rafts to
await rescue, which came shortly thereafter via ferry boats operating in the area, followed
by the coastguard, FDNY, NYPD and other such agencies operating in the area.

The survival of all 150 passengers (including a lap-held child) can be attributed to a few
lucky circumstances: the high levels of skill and experience of the pilot and co-pilot, the
fact that the aircraft they were flying happened to be outfitted for water landings even
though it was flying over land and was thus not required to be, and the rapid response and
rescue of the passengers.
For this accident it is hard to find people to blame. The engines were in good condition 
(before the strike), the pilots preformed flawlessly under the circumstances, there was 
almost nothing the flight controllers could have done to spot the birds in advance of the 
collision, and there was little to nothing that could have been done to make an engine that 
could handle the size and number of birds that stuck in this case. According to the 
investigation the radar systems used by flight controllers do have the ability to spot birds 
but were only able to display to the air traffic controller that they were there very shortly 
before impact. The system may have detected the presence of the birds previous to when 
they displayed them but it would be almost impossible for a flight controller to handle 
sorting though every single object the radar system detects manually. Because of this the 
system automatically screens out most of the data leaving behind objects moving in a 
relatively regular fashion. In this case the computer didn’t recognize the birds until it was 
too late. In theory there are better systems that could detect the birds but these are usually 
determined unneeded since airports are required to actively get rid of birds living in the 
surrounding areas such that they do not get sucked into engines. LGA had taken all 
appropriate actions and the airspace around LGA is almost always clear of birds, 
however, in this instance the birds involved were not a local species (they were migrating 
from elsewhere) and thus there are no measures against this (personally I think they 
should build a laser that shoots down rogue birds especially Canada geese). It also turns 
out that these birds were of a species larger than the normal Canada geese population of 
the area (average mass of local geese is 8.41-9.23 lbs for males, 7.31-7.75lbs for 
females), which further exacerbated the problem. I should also mention that January is 
one of the least likely months for a bird strike to occur in the NYC area.
If we really need to blame someone it would be the FAA. At the time of the crash the engines involved only needed to be certified to sustain strikes from medium sized birds (1 ½ pounds) to the core and large sized birds (5 ½ pounds) to the fan. These tests also assume a fan speed of 100% whereas in the case of the accident the fan was at 80% speed. Now you may be thinking “wouldn’t a higher fan speed mean the engine can take more damage?” and you would be right except for the fact that centrifugal force is involved. At high speed the fan blade can act as a centrifugal separator to push the bird away from the center of the engine effectively shielding the engine core from loose birds. At lower fan speeds this effect is less so more damage to the engine core could occur. The NTSB report states that the FAA should change the testing requirements to include different fan speeds, particularly those often used during ascent or decent, when bird strikes are most likely. The NTSB also recommended that the FAA increase the constraints on aircraft ditching because in the case of the Airbus 320 it is extraordinarily difficult if not impossible to accomplish the speed and pitch recommendations from Airbus without the use of engines. Adding more strict regulations and increasing pilot training are really the main things to do (unless you build a laser that shoots down the birds before they can enter the engines). The report also recommends that work be done to build a system that can detect the cause of a problem in the engine and inform the captain so in the case here it would have been able to tell the pilots that it wasn’t worth there time or energy to try relighting the engines.
Bibliography


All information was form the above source.

Instructor’s Comments

- Did not give time of day for accident – this can be very important (night vs. day)
- Did not give name of pilot – who became a “local hero” for saving the passengers
- Lack of “secondary causes” is understandable – but maybe that makes this accident not a good choice for the paper
- Only one source given instead of the requested minimum of three sources, and no in-line citations provided