Birds and aircraft: fighting for airspace in increasingly crowded skies

Richard A. Dolbeer, PhD
Science Advisor, USDA,
Bird Strike Committee-USA

15 January 2009,
US Airways Flight 1549
Miracle on The Hudson

AAWHG, Gold Coast
2 Nov 2016
25 June 1969, Cleveland, Ohio
25 June 1969, Cuyahoga River, Cleveland, Ohio
1962: *Silent Spring* published
1969: Cuyahoga River burns

- 1970 – Earth Day (Senator Gaylord Nelson)
- 1970 – Environmental Protection Agency
- 1970 – Clean Air Act
- 1971 – National Wildlife Refuge System expanded
- 1972 – Clean Water Act
- 1972 – Migratory Bird Treaty Act expanded
- 1972 – DDT banned by EPA
- 1972 – Marine Protection & Sanctuaries Act
- 1973 – Endangered Species Act
2016: Cuyahoga River, Cleveland, OH
Nesting pairs of bald eagles in contiguous USA

Nesting pairs

DDT banned

Year
American white pelican population trend, N. America, 1966-2015

DDT Banned
14-fold increase!

Osprey population trend, VA to ME, 1966-2015

Graph by R. A. Dolbeer, Data from North American Breeding Bird Survey

DDT Banned
Double-crested cormorant population trend, N. America, 1966-2015
Canada geese in N. America, Resident vs migratory

Graph by R. A. Dolbeer based on data from U.S. Fish and Wildlife Service (2015)
Adaptation of wildlife to urban settings
Adaptation of wildlife to urban settings
Gulls resting on runway

Canada geese grazing
JFK International Airport, New York City, 1980s

Jamaica Bay National Wildlife Refuge
Laughing Gulls began nesting adjacent to JFK Airport, 1979:

*Increase of LAGU Strikes, 1979-1990
*Growth of Nesting Colony, 1979-1990
Laughing gulls in Joco Marsh with view of JFK International Airport, 1991

Bird Strikes
MANAGING BIRDS AT AIRPORTS TO IMPROVE AVIATION SAFETY

Sammy Chevalier, retired long-time head of the JFK Bird Patrol Unit, holds remains of laughing gulls that collided with a departing airplane.
In 1991, I designed an experimental program to shoot gulls attempting to fly over the airport from the protected marsh areas in Jamaica Bay.
Shotgun-toting feds killing sea gulls at JFK Airport

BYE, BYE BIRDIE!

NICE SHOT!!!
G-men kill 15,000 gulls at JFK airport

At JFK, waging all-out war on laughing gulls

Thousands of gulls shot at airport

Sea gulls a target at JFK

Sea gulls shot down at N.Y. airport

Feds’ Gull Massacre: It’s Them or Us

Feds’ Gull Massacre: It’s Them or Us

War is declared on gulls
TVC airport hires gunmen to kill gulls

New York airport hires gunmen to kill sea gulls

Almost 15,000 Gulls Shot as Airport Hazard

USDA killed thousands of breeding gulls at airport

15,000 sea gulls are shot down

And environmentalists are not laughing over it

15,000 gulls shot to clear airspace at Kennedy

Laughing gulls are no laughing matter

15,000 gulls shot to death at Kennedy airport in New York

Airport has gulls killed

USDA shot gulls, cites plane-collision risk

JFK uses gunmen to kill gulls

15,000 gulls shot at JFK airport

15,000 gulls shot at NYC airport

Killed because of risk to planes

14,886 gulls shot near JFK

15,000 “Laughing” Gulls Eliminated at JFK

Another Round: Guns vs. Gulls at Kennedy Airport

New York airport hires gunmen to kill sea gulls
The number of aircraft striking Laughing Gulls was dramatically reduced at JFK Airport, NY, 1991 - 2015

5/yr (-97%)
1995: Two major strike events at U.S. airports involving resident Canada geese

June 1995: Aircraft: Concorde
Location: JFK International, New York
Damage: 2 engines destroyed
Wildlife species: Canada geese

Sept 1995: Aircraft: E-3 AWACS
Location: Elmendorf AFB (AK)
Damage: 24 fatalities
Wildlife species: Canada geese

Alaska crash raises the question: How large a threat?
Amplified bird-strike risks related to population increases of large birds in North America

Dr. Richard A. Dolbeer & Capt. Paul Eschenfelder

- Most of the 36 bird species in North America with body masses >4 lbs showed population increases since 1970.
- 30% of strikes with >4-lb birds involved multiple birds.

To address threat by increased populations of large flocking birds:
- Reevaluate airworthiness standards,
- increased R&D: 1) bird-detecting radar for flocks of large birds and 2) lighting/paint to make aircraft more visible to birds,
- Management programs to reduce populations of overabundant large species such as non-migratory Canada geese near airports.
Engine failure caused by Canada geese during departure of Fokker 100 from LaGuardia Airport, New York, USA
June 2004: Capture and euthanasia of geese at Rikers Island next to LaGuardia Airport creates public controversy.
Late June 2004: First goose round-up during molt at Rikers Island, NYC near LGA. Round-ups repeated in June 2005-2015
Canada geese removed from Rikers Island next to LaGuardia Airport, New York City, June 2004-2015

Canada goose removal, Rikers Island, NY

N = 1,617
Management of Canada goose strikes involves 2 very different components:

- Resident geese
- Migratory geese
16 Sep 2004, 2300 feet AGL, 5 miles from Chicago O’Hare

MD-80 ingested 5-lb Double-crested Cormorant into #1 engine. Engine destroyed.
August 22, 2007

The Honorable Robert Sumwalt
Vice Chairman
National Transportation Safety Board
490 L’Enfant Plaza, SW
Washington, D.C. 20594 USA

Re: NTSB Safety Recommendations A-99-86:94

Dear Mr. Sumwalt,

As Chairman of Bird Strike Committee-USA, the Steering Committee has asked me to write to you on their behalf to express grave concern regarding the continuing hazard posed to aviation in America today by conflict with wildlife, particularly birds.
American White Pelican (7 kg)

- Oklahoma City, March 4, 2008
- 5 fatalities

Cessna 500 Citation I

Mexico City

Map by Cornell Lab of Ornithology
Range data by NatureServe
Cessna Citation I crash, 4 March 2008 (5 fatalities), 1900 feet AGL
15 January 2009,
US Airways Flight 1549
Miracle on The Hudson
3:25:52 Flight 1549 begins T/O from LaGuardia.

3:27:36 Flight 1549: “This is Cactus 1539. Hit birds, lost thrust in both engines. We're turning back towards LaGuardia.”

3:29:21 ATC: "Cactus 1529, turn right 2-8-0, you can land runway one at Teterboro."

3:29:25 Flight 1549: "We can't do it."

3:29:26 ATC: "OK, which runway would you like at Teterboro?"

3:29:28 Flight 1549: "We're gonna be in the Hudson."

3:30:30 (60 seconds later) Flight 1549 is floating in the water

3:32:00 (90 seconds later) All 150 passengers are evacuated!

3:34:05 (120 seconds later) First ferry boat arrives at scene; rescue commences.
The major suspects

- Snow goose: 6-7 lbs
- Canada goose: 8-10 lbs
- Brant: 3 lbs

Weights:
- 4 lbs
Five Christmas Bird Count circles, New York City area, 2004-2009

- Mean # of birds

- Canada Goose: 18,000
- Brant: 13,000
- Snow Goose: 3,000
- DC Cormorant: 500
Bird remains were subjected to:

* Morphological analysis,
* Mitochondria DNA analysis,
* Stable hydrogen isotope analysis.
Smithsonian Feather Laboratory Staff, Washington, D.C.

Roxie Laybourne 1910-2003
Feather analysis = *Branta* sp.

mDNA analysis = Canada goose
Stable hydrogen isotope analysis = Migratory C. geese from N. Labrador

Flight 1549, 15 Jan 2009

Feather molt, June 2008

Flight 1549, 15 Jan 2009

δD (per mill)
Committee on Transportation and Infrastructure, U.S. House of Representatives, 24 Feb 2009
Our big challenge is strikes with large flocking birds away from airports.

We are making a difference in reducing strikes with high-hazard birds in the airport environment.
Damaging strikes to commercial aircraft at civil airports (≤1500 ft AGL) are declining!

- All damage strikes at ≤1500 ft AGL
- All damage strikes at >1500 ft AGL

R² = 0.82
R² = 0.03
This report provides a 5-part summary of wildlife strikes with civil aircraft for KJFK, 2011-2015.

<table>
<thead>
<tr>
<th>Number of reported:</th>
<th>Year 2015</th>
<th>2011-2015 (5-year avg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wildlife strikes at (\leq)1500 feet AGL(^a)</td>
<td>190</td>
<td>190.4</td>
</tr>
<tr>
<td>Wildlife strikes at (\leq)1500 feet AGL causing adverse effect(^b)</td>
<td>7</td>
<td>6.8</td>
</tr>
<tr>
<td>Wildlife strikes at (&gt;)1500 feet AGL(^a)</td>
<td>19</td>
<td>16.8</td>
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<tr>
<td>Wildlife strikes at (&gt;)1500 feet AGL causing adverse effect(^b)</td>
<td>2</td>
<td>2.2</td>
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<tr>
<td>Aircraft movements - air carrier and General Aviation</td>
<td>441,981</td>
<td>419,964</td>
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<tr>
<td>Airport(s)</td>
<td>Adverse effect strikes/100K movements</td>
<td>(5-yr avg)</td>
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<td>------------</td>
</tr>
<tr>
<td>KJFK</td>
<td>1.58</td>
<td>1.62</td>
</tr>
<tr>
<td>26 Part 139 airports in Region</td>
<td>1.03</td>
<td>0.98</td>
</tr>
<tr>
<td>210 Part 139 airports in USA</td>
<td>1.14</td>
<td>1.06</td>
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</table>
### Part 2. Number of adverse effect strikes at >1500 feet AGL per 100,000 aircraft movements at KJFK. 2011-2015.

<table>
<thead>
<tr>
<th>Airport(s)</th>
<th>Adverse effect strikes/100K movements</th>
<th>(5-yr avg)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>KJFK</td>
<td>0.45</td>
<td>0.52</td>
<td>Adverse effect strike rate at KJFK in 2015 (0.45) was 13% below 5-year average at KJFK (0.52)</td>
</tr>
<tr>
<td>26 Part 139 airports in Region&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.34</td>
<td>0.34</td>
<td>Adverse effect strike rate at KJFK in 2015 (0.45) was 32% above average for region (0.34)</td>
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<tr>
<td>210 Part 139 airports in USA&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.32</td>
<td>0.29</td>
<td>Adverse effect strike rate at KJFK in 2015 (0.45) was 41% above average for USA (0.32)</td>
</tr>
</tbody>
</table>
Can we make aircraft more “visible” to birds?
Many birds can **see** in ultraviolet range (but they do not **hear** in ultrasonic range)
Birds do not see well in red end of spectrum

5 Sept 2016, Baltimore-Washington IA
200 feet AGL on Final Approach
5 Sept 2016, Baltimore-Washington IA
200 feet AGL on Final Approach
Our Goal:
Safer Skies for all who fly ....

Birds *and* People!

Questions?
Canada goose strikes, Part 139 airports, USA