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Introduction to Special Topic

Birds and aircraft—fighting for airspace in ever more crowded skies

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This special issue of *Human–Wildlife Conflicts* (*HWC*) was conceived 1 year ago by Bird Strike Committee–USA (BSC–USA) and the Berryman Institute. Our premise was that the collision of aircraft with birds (bird strikes) and other wildlife is a growing problem about which the general public and most scientists and wildlife biologist know very little. Furthermore, although considerable work has been done to mitigate the risks caused by bird strikes, there have been few peer-reviewed publications of these research and management efforts. Thus, our 2 goals were to (1) educate the broad readership of *HWC* about the growing safety and economic problems caused by bird strikes, and (2) provide an outlet for peer-reviewed research and commentary on methods to mitigate these risks. Most of the papers published in this edition are based on technical presentations delivered at the joint meeting of BSC–USA and BSC–Canada hosted by Orlando-Sanford International Airport, Florida, in August 2008 (<*www.birdstrike.org*>).

In the aftermath of the miraculous ditching of US Airways Flight 1549 in the Hudson River on January 15, 2009, in which 155 passengers and crew were safely evacuated, the goal of education about bird strikes has been achieved. Although those of us working on this problem were aware that at least 210 aircraft have been destroyed by bird strikes and other wildlife strikes in the past 20 years (Richardson and West 2000; Thorpe 2003, 2005; Dolbeer, unpublished data), this single, highly-publicized event dramatically demonstrated to the world at large that birds can bring down large transport aircraft. Based on the analysis of bird-remains recovered from the downed aircraft, the National Transportation Safety Board (NTSB) released interim findings on February 12, 2009 (NTSB 2009). The report stated that at least 1 Canada goose (*Branta canadensis*) had been ingested into each engine of the Flight 1549 Airbus 320 after its departure from LaGuardia Airport, New York (NTSB 2009).

The publication of this special issue of *HWC* in June 2009 marks, to the month, the fortieth anniversary of a landmark environmental event that is directly related to the Flight 1549 bird strike. In June 1969, the highly-polluted Cuyahoga River in Cleveland, Ohio, caught fire, burning docks near the outlet into Lake Erie. This infamous and widely-publicized event was a major catalyst in arousing a groundswell of public support for environmental clean-up and protection. Between 1969 and 1972, the U.S. Congress enacted a remarkable suite of environmental legislation and programs. This legislation included passage of the Clean Water and Endangered Species acts and the establishment of the Environmental Protection Agency. The National Wildlife Refuge System was greatly expanded, Earth Day was established, environmental education programs were developed in schools nationwide, and a strong environmental ethic developed among the general population.

As a result of these and other actions to protect the environment, we have witnessed dramatic increases in populations of most of the large bird species in North America (Dolbeer and Eschenfelder 2003). For example, 13 of the 14 largest (>3.6 kg body mass) bird species have shown significant population increases in the past 40 years. As 1 relevant example, the migratory and nonmigratory population of Canada geese (4.2 kg) has more than quadrupled from 1.2 million to 5.5 million birds in North America from 1970 to 2008 (Dolbeer and Seubert 2009). In addition to these population increases, many birds have adapted to urban environments and have found that airports, with their large areas of grass and pavement, are attractive habitats for feeding

and resting. Further exacerbating the problem, modern aircraft with quieter turbofan-powered engines are less obvious to birds (Burger 1983, Kelly et al. 2001).

This increase in large-bird populations is especially problematic to the aviation industry because aircraft components, including engines, are not tested or certified for birds weighing >3.6 kg (MacKinnon et al. 2001). Most components are tested for 1.8-kg birds, maximum. Most disturbing is that it is acceptable for transport aircraft engines to lose all power after ingesting a large bird (1.8, 2.7, or 3.6 kg bird, depending on size on engine). The only requirements to pass the test are that the engine can be shut down safely and that the damage be contained within the engine casing (FAA 2001). The engines on the Flight 1549 Airbus 320, both of which lost power after ingesting geese, performed exactly as they were certified to perform.

About 7,670 wildlife strikes with civil aircraft were reported in 2007 in the United States, compared to 1,759 in 1990 (Dolbeer and Wright 2008). Commercial aircraft movements increased about 13% during this period. Hopefully, this special issue of *HWC* will serve as a catalyst for new research and technology that will further mitigate the risk of bird strikes in a science-based and ecologically sound manner. The need is real and urgent. Birds and aircraft literally are competing for airspace in increasingly crowded skies.

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