MANDATORY REPORTING: HOW GOOD IS GOOD ENOUGH?

G.F. Searing

Gary F. Searing, M.Sc., Wildlife Hazard Specialist, Airport Wildlife Management International

North Saanich, British Columbia, Canada gfs@airportwildlife.ca

INTRODUCTION

There has been considerable debate in the bird strike community as to the need for and importance of mandatory reporting of bird strikes. Coupled with the recent public release of the US FAA wildlife strike data base which is compiled from non-mandatory reports of strikes, the issues associated with strike reporting are once again in the forefront.

Canada has had mandatory reporting of wildlife strikes since May 2006 as the result of Civil Aviation Regulation (CAR) 302.303 which requires airports to keep records of all strikes and report them to Transport Canada within 30 days or annually. Obviously the intent of this regulation is to improve the proportion of strikes reported to Transport Canada thereby improving the quality of the national strike data base.

Given that 3 full calendar years (2007-2009) have elapsed since CARS 302.303 has come into force, it is reasonable to examine the results of strike reporting in Canada to evaluate the effectiveness of mandatory reporting of wildlife strikes. In order to conduct an adequate assessment, a large amount of information about strikes must first be obtained. To do this on a national scale would be a monumental undertaking and would likely fail because of lack of familiarity with the strike information at each individual airport. Therefore, I have elected to use the strike data that I have maintained at the Vancouver International Airport (YVR) since 2000. Assuming that Vancouver is typical of most large international airports in Canada in that the airport has made a significant effort to compile a complete data base of strikes, an analysis of those strikes and related aircraft movements at YVR can be assumed to represent the status of bird strike reporting throughout Canada.

AIRPORT DESCRIPTION

YVR is an urban airport located in Richmond, British Columbia, a suburb of Vancouver. It occupies most of Sea Island situated between the north and middle arms of the Fraser River. It contains two parallel runways of 3029-3505 m in length (08-26) and a “crosswind” runway that is 2225 m long (12-30). A short (1066 m) fourth runway (26A) at the very south end of the airport is seldom used and only by commuter aircraft. The airport is adjacent to the river on the south and east sides, a conservation area to the north and the ocean (Strait of Georgia) to the west.

YVR hosts 20 Canadian airlines three of which serve only international destinations, three serve Canadian and international destinations, 1 serves Canadian destinations outside of British Columbia and 13 serve British Columbia destinations. There are 8 US carriers flying to and from US destinations and 24 international (non US) carriers. In addition, a number of freight carriers operate out of YVR.

The airport’s location in the Frasier River estuary, a RAMSAR site of international significance primarily because of large and diverse wintering bird populations, presents a substantial challenge to the airport in bird strike prevention. As a result, YVR has developed a dynamic wildlife control program with 2-5 wildlife

controllers on shift at all times (24 h/d) and a monthly review of program effectiveness by a wildlife technical committee with a view to continual improvement of the wildlife control program to resolve new or existing control issues. Monthly and annual reports of all strikes, control efforts and monitoring results are also prepared.

METHODS

This paper is based on bird strike data compiled by the YVR wildlife program from 2000-2009. Strike records are from wildlife controllers responding to bird strike reports or collecting carcasses during runway sweeps or response to FOD radar alarms, records posted to Civil Aviation Daily Occurrence Reporting System (CADORS), and records entered into Transport Canada's national bird strike data base. Strikes were attributed to YVR when they occurred below 250 feet on approach or below 500 feet on departure.

Because mandatory reporting of wildlife strikes by airports became effective in May 2006, I considered the "pre-mandatory" period to have been from 2000 to 2006 inclusive. By 2007 the regulation had been in place for 7 months and YVR (and all Canadian airports) should have been fully compliant. For comparison with Canadian strike records published by Transport Canada, reports for 2004 and 2005 were compared with those from 2007 and 2008.

Aircraft movement data have been compiled from aircraft scheduling information in the Sabre data base. Those data were readily available and provided a relatively easy method of compiling movement information. However, they are not entirely accurate in that they do not reflect equipment changes and cancelled flights. Over the course of 10 years and over 2 million movements, the effect of cancelled flights and equipment changes is thought to be minimal.

RESULTS

Transport Canada Data Base

The total number of strikes reported to Transport Canada during 2004 and 2005 were 2392 versus 2554 reported during 2007 and 2008 representing a 7% increase in strike reporting after mandatory reporting came into effect in Canada. In the Pacific region the change in number of strikes reported also was 7% (585 versus 627). By comparison, the number of strikes in the YVR strike data base (excluding those only reported by Transport Canada) increased by 13% between the two periods. Therefore, it is likely that the 7% increase in strike reporting nationwide was the result of increased numbers of strikes rather than improved reporting.

Because the regulation requires only airports to report strikes, for the regulation to have been effective the increase, if any, should have occurred from an increase in airport reporting. Although Transport Canada reports do not consistently report the number of strikes reported by airports, they do present the percentage of strikes which originated from airport reports. These ranged from 8-30% in 2004-2005 to 12-39% during 2007-2008. Given the large variability, it is unlikely that any change would be noted statistically, but because I did not have access to data by individual airports, I was not able test this statistically.

YVR strike reports in the Transport Canada data base actually decreased between 2000-2006 and 2007-2009 (Table 1). Until 2006 Transport Canada's data base contained 44% of strikes only reported by YVR

personnel. After 2006 this percentage decreased to 9%. When strikes were posted in CADORS, the percentage in the national data base increased substantially, but was not 100% as one would expect it to be and there was a small decline from 2000-2006 to 2007-2009. Some strikes are reported directly to Transport Canada (and only to Transport Canada). From 2000-2006 the percentage of YVR strikes that were directly reported was 9.6%, thereafter it was 9%; essentially unchanged.

Table 1. Proportion of strikes in YVR data base that occur in Transport Canada's data base.

Year Range	Total Strikes	Reported by both YVR & CADORS	Reported by YVR only	Reported by CADORS only
2000-2006	71%	94%	44%	78%
2007-2009	63%	88%	9%	84%

Airport Reporting of Strikes

As mentioned above, the Vancouver International Airport Authority endeavours to identify and report all wildlife strikes from aircraft arriving or departing from YVR according to Transport Canada's (CARS 302.303) definition of a bird strike:

- a pilot reports a bird strike
- aircraft maintenance personnel identify damage to an aircraft as having been caused by a bird strike
- personnel on the ground report seeing an aircraft strike one or more birds
- bird remains, whether in whole or in part, are found on an airside pavement area or within 200 feet of a runway, unless another reason for the bird's death is identified.

Except for carcasses found on the airport by wildlife controllers, all strike reports by YVR personnel have been the result of second-hand information – typically pilot reports of a strike to air traffic control personnel.

During the period from 2000-2006, YVR personnel reported an average of 120 strikes per year with an additional 19 strikes reported in CADORS but not by YVR. From 2007-2009 the annual rate reported by YVR personnel was 136 strikes with an additional 29 strikes per year only reported in CADORS. This represents a 13% increase in YVR recorded strikes from the pre to post regulation period. To determine the increase in CADORS reporting at YVR, one needs to include all CADORS reports not just those that were not reported by YVR personnel. Reporting of bird strikes by Nav Canada personnel in CADORS increased by 47% from 2000-2006 to 2007-2009. The rate at which bird strike reports from pilots to Nav Canada were relayed to YVR personnel did not change between 2000-2006 (74%) to 2007-2009 (73%) indicating that tower personnel behaviour did not affect the results. The considerable increase in CADORS reports likely indicates a greater awareness of pilots and airlines to the bird strike issue resulting in more pilot reporting of bird strikes.

Airline Reporting of Strikes

Improved pilot reporting of wildlife strikes may be the result of pilot education through media reports, but is most likely the result of airline directives. Therefore, it is useful to assess bird strike reporting by individual airline. Because bird strike rates are dependent upon the type of aircraft used (Searing in review[1]), each airline has its own expected strike rate based on its fleet mix (Table 2).

[1] Paper presented at 2010 North American Bird Strike Conference in Salt Lake City, Utah and submitted to Human-Wildlife Conflicts for publication).

Five airlines (3% of YVR movements) did not report any strikes; 4 airlines (30% of YVR movements) had unchanged strike rates between 2000-2006 and 2007-2009, 14 airlines (47% of movements) had increased strike reporting rates from 2000-2006 to 2007-2009, 12 airlines (10% of movements) had a decreased reporting rate and 30 airlines (10% of movements) were not in business during one or other of the two periods (2000-2006 or 2007-2009). Overall, there was a 10% increase in strike reporting from 2000-2006 to 2007-2009.

If we group airlines by Canadian airlines, US airlines and other international airlines a clear picture emerges. Canadian airlines have the highest strike reporting rate which increased by 3% from the pre to post CARS 302.303 period. Based on calculation of expected strikes, Canadian airlines appear to report 97% of all strikes known to airlines (i.e., does not include unreported strikes identified in Table 3; many of which would be unknown to pilots or airlines). US airlines have a lower reporting rate, but that rate increased by 56% from 2000-2006 to 2007-2009, likely because of the large amount of efforts being made in the US to encourage bird-strike reporting. However, they only report 62% of strikes that their aircraft are expected to incur. Other international airlines had a still lower reporting rate but increased their reporting rate by 10% from the pre to post CARS 302.303 period. Their calculated reporting rate was 54%.

Unreported Strikes

No matter how effective a strike reporting system is, there will always be unreported strikes. Large aircraft that strike small birds in the least sensitive portions of the aircraft (e.g. fuselage, landing gear) are far less likely to notice that there has been a bird strike than smaller aircraft. If there is no blood stain, then the pilot is not likely to notice anything unusual during the required “walk-around”, nor will maintenance find any evidence during their periodic inspections. Realistically, there are also known strikes that go unreported either because the pilot does not recognize the importance of reporting strikes or because strikes that occur during take-off, if unknown to the pilot, may only be found on inspection after landing. In that scenario the strike may be attributed to the wrong airport, especially if no attempt is made to identify the species involved.

Table 2. Airline strike rates before and after passage of CARS 302.303.

Group	Airlines	2000-2006 Movements	Strikes	Rate/1000	2007-2009 Movements	Strikes	Rate	Pre vs Post Regulation Change	Reported Strikes	Adjusted Strikes
Canada	Air BC	93742	19	0.20	0	0	-	N/A	19	40
Canada	Air Canada	333226	420	1.26	151648	192	1.27	0%	612	612
Canada	Air Canada Jazz	219670	86	0.39	166104	84	0.51	29%	170	177
Canada	Air North	2850	2	0.70	2410	1	0.41	-41%	3	3
Canada	Air Transat	552	5	9.06	1356	3	2.21	-76%	8	8
Canada	Canada 3000	6704	7	1.04	0	0	-	N/A	7	7
Canada	Canadian	73424	74	1.01	0	0	-	N/A	74	74
Canada	Canjet	296	1	3.38	0	0	-	N/A	1	1
Canada	Central Mountain Air	50260	17	0.34	25336	8	0.32	-7%	25	25
Canada	First Air	82	0	0.00	0	0	-	N/A	0	0
Canada	Harbour Air	6542	1	0.15	15176	2	0.13	-14%	3	3
Canada	Harmony Airlines	7254	7	0.96	794	1	1.26	31%	8	8
Canada	Hawk Air	18444	8	0.43	7354	4	0.54	25%	12	12
Canada	Helijet Airways	33654	4	0.12	4500	5	1.11	835%	9	9
Canada	Jetsgo	5062	4	0.79	0	0	-	N/A	4	4
Canada	Pacific Coastal	105510	17	0.16	63378	19	0.30	86%	36	42
Canada	Sunwing	0	0	-	636	0	0.00	N/A	0	0
Canada	West Coast Air	7028	1	0.14	20288	1	0.05	-65%	2	2
Canada	Westjet	127256	96	0.75	87080	76	0.87	16%	172	172
Canada	Zip	15152	11	0.73	0	0	-	N/A	11	11
Canada	Zoom	934	1	1.07	1020	1	0.98	-8%	2	3
Canada	All Airlines	1107642	781	0.71	547080	397	0.73	3%	1178	1213
International	Air China	3418	7	2.05	2150	1	0.47	-77%	8	8
International	Air Pacific	1092	0	0.00	574	0	0.00	no reports/low movement	0	1
International	Air Via	1460	0	0.00	362	0	0.00	no reports/low movement	0	1
International	Asiana Airlines	732	0	0.00	0	0	-	no reports/low movement	0	1
International	British Airways	5504	3	0.55	2806	4	1.43	162%	7	7
International	Cathay Pacific	16708	16	0.96	7148	12	1.68	75%	28	28
International	China Airlines	4520	0	0.00	2040	0	0.00	no reports	0	6
International	China Eastern	1230	0	0.00	1258	0	0.00	no reports/low movement	0	3
International	Condor	252	0	0.00	284	0	0.00	no reports/low movement	0	1
International	Eva Airlines	2640	2	0.76	1116	0	0.00	large decrease	2	3
International	Flyglobspan	0	0	-	554	1	1.81	N/A	1	1
International	Flywoosh	3298	0	0.00	0	0	-	N/A	0	3
International	Japan Airlines	7280	5	0.69	2876	0	0.00	large decrease	5	9
International	KLM	3840	4	1.04	1918	1	0.52	-50%	5	5
International	Korean Airlines	2024	0	0.00	1160	0	0.00	no reports	0	5
International	LTU	260	0	0.00	386	0	0.00	no reports/low movement	0	1
International	Lufthansa	5000	1	0.20	2114	0	0.00	decrease	1	7
International	Mandarine Air	204	0	0.00	0	0	-	N/A	0	0
International	Martin Air	1026	0	0.00	186	0	0.00	no reports/low movement	0	2
International	Mexicana	3354	0	0.00	3210	0	0.00	no reports	0	4
International	New Zealand Airlines	0	0	-	610	0	0.00	N/A	0	1
International	Oasis Hong Kong	0	0	-	580	0	0.00	N/A	0	1
International	Phillipine Airlines	3730	0	0.00	3166	2	0.63	large increase	2	8
International	Quantas Airlines	510	0	0.00	118	0	0.00	no reports/low movement	0	1
International	Singapore Airlines	2226	1	0.45	726	1	1.38	207%	2	4
International	Thomas Cook	0	0	-	752	0	0.00	N/A	0	1
International	All Airlines	70308	39	0.55	36094	22	0.61	10%	61	112
US	Alaska Airlines	54172	36	0.66	13554	8	0.59	-11%	44	45
US	Alliance Air	37450	0	0.00	0	0	-	no reports	0	21
US	Aloha Airways	2152	2	0.93	0	0	-	N/A	2	2
US	American Airlines	15326	4	0.26	5022	2	0.40	53%	6	10
US	American Eagle	244	0	0.00	0	0	-	no reports/low movement	0	0
US	American West	9360	0	0.00	1768	4	2.26	large increase	4	9
US	Compass	0	0	-	946	1	1.06	N/A	1	1
US	Continental Airlines	9418	5	0.53	4228	0	0.00	large decrease	5	9
US	Delta	2394	0	0.00	1002	2	2.00	large increase	2	2
US	Expressjet	0	0	-	334	2	5.99	N/A	2	2
US	Freedom	0	0	-	274	0	0.00	N/A	0	0
US	Frontier	0	0	-	682	0	0.00	N/A	0	0
US	Horizon Air	40930	20	0.49	21388	10	0.47	-4%	30	30
US	Mesa	2922	0	0.00	68	0	0.00	no reports	0	2
US	Northwest Airlines	10928	5	0.46	3094	1	0.32	-29%	6	14
US	TWA	1730	1	0.58	0	0	-	N/A	1	1
US	United Airlines	49030	15	0.31	22996	13	0.57	85%	28	58
US	US Airways	4772	0	0.00	0	0	-	N/A	0	5
US	All Airlines	240828	88	0.37	75356	43	0.57	56%	131	211
	All Airlines	1418778	908	0.64	658530	462	0.70	10%	1370	1536

I used two methods to attempt to estimate unreported strikes. The first approach was to assume that the strikes when carcasses were found versus those when the carcass was not found would not change whether or not the strike was reported. We have data for all reported strikes as to whether the carcass was found or not. We also have data for carcasses found when there was no bird strike report. Using ratios, it is a simple exercise to calculate the likely number of strikes that were unreported and in which no carcass was found. The results are presented in Table 3. The estimate of 100 unreported strikes in which a carcass was not found represents approximately 6% of the total known strike numbers (1616 strikes).

Table 3. Estimation of unreported strikes from carcass recovery data.

Strike Reported Bird Found	693	Strike Not Reported Bird Found	83
Strike Reported Bird Not Found	835	**Strike Not Reported Bird Not Found**	**100**

The second approach used has some known flaws. By using strike rates of individual aircraft (Searing in review), the expected strike rate for each airline can be calculated based on the number of movements of each aircraft in the airline's fleet. The flaw that I could not resolve in this method is that the information on strike rates for individual aircraft came from the YVR strike data base and thus have been influenced by the parameter being measured. Therefore, the results of this analysis must be interpreted with caution. However, they can be used to determine if the previous estimate of 100 unreported strikes is a reasonable estimate.

As presented in Table 2 above, I examined the number of strikes reported by each airlines and estimated the number of strikes that would be expected given the movements and types of aircraft flown. I then adjusted strike numbers for any airline whose reported numbers were less than expected numbers. Although I was not able to use all of the data for this analysis due to problems in airline coding and strike reporting, I was able to account for 85% of the reported strikes with scheduled airlines. Thirty-three airlines reported strikes at a rate less than expected given their fleet mix and movement rate (Table 4). By adjusting the strikes of these airlines to expected rates, an additional 166 strikes would be expected representing 12% of the reported strikes by all airlines represented in Table 4 (1370 strikes).

Table 4. Status of airline strike reporting by carrier type.

Strike Reporting	Canadian Carrier	US Carrier	International Carrier
Expected or better	12	5	6
Less than expected	4	8	21
No strikes expected	3	5	1

These results indicate that 75% of Canadian carriers had expected or higher reporting rates whereas 61% of US carriers had lower than expected rates and 78% of international carriers had lower than expected rates.

DISCUSSION

Transport Canada Data Base

Based on information regarding wildlife strikes at YVR contained in the national wildlife strike data base, the data base is in dismal condition. Despite mandatory reporting introduced in 2006, only about 2/3 of all known strikes actually have been entered into the data base. Twelve percent of the strikes in Transport Canada's own CADORS are not included in the national strike data base. The lack of YVR strikes in the data base are not likely due to failure of YVR to report, rather they are the result of lack of communication within Transport Canada. The regulation does not specify who within Transport Canada strikes must be reported to. YVR managers have informed me that wildlife strikes are reported to the regional office of Transport Canada each month. However, Transport Canada personnel in Ottawa reported to me the lack of strike reporting by YVR and indicated that they see no similar gaps in data at other airports in Canada many of whom apparently report their strikes through the online reporting system (http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/bsis/).

Conversely, 9-10% of strikes in the national data base are essentially unknown to the airports where the strike occurred because they were reported directly to Transport Canada. The strike data in the data base contain a large amount of errors including incorrect aircraft type, airlines, species, and times as well as many duplicate and even triplicate records. Furthermore, the allowance of strike numbers to be placed into large categories such as 2-10, 11-100, make analysis of the strike reports difficult (because of non-numeric field data) and inaccurate (the difference between 2 and 10 swans is major in terms of the hazard of the strike, much less the difference between 11 and 100).

Unlike the strike data base in the USA, the Transport Canada data base is not public and relevant portions are generally only released to the airports where the strike occurred. Yet CADORS is public and anyone who wants to search for bird strikes can access about 2/3 of the records in the Transport Canada data base. This could lead to inappropriate conclusions based on incomplete data. Transport Canada asserts that there is sensitive data contained in the data base. However, there appears to be no reason for the majority of the fields in the data base not to be available to the public.

Effectiveness of Mandatory Reporting

Given that there has only been a 10-13% increase in strike reporting from before to after CARS 302.303 became effective and some or all of this increase may have been from a real increase in strike numbers, it is difficult to argue that the passage of mandatory reporting legislation has improved strike reporting in Canada. In my opinion the regulation was based on a lack of understanding of the process of strike reporting and, therefore, was unlikely to significantly improve strike reporting. The regulation requires airports to report strikes. Airports do not strike birds – aircraft strike birds and pilots are the ones who experience the strike and either report or fail to report strikes. Airlines also find strikes during regular maintenance work on aircraft while at the gates. Airport personnel only find 5% of the strikes at YVR; that is, they identify an unreported strike by finding a carcass on or near the runway. Airports have virtually no ability to improve on strike reporting – that burden rests with pilots.

The strike reporting rate varies substantially by airline. International airlines (i.e., those airlines originating outside of North America) as a group contain many of the worst bird strike reporting companies. US airlines as a group are not much better. The data show that Canadian companies are generally very good at reporting strikes. This obviously presents a dilemma for legislators because they are not able to

reasonably ”force” non-Canadian airlines to comply short of revoking licenses to fly into Canada – a “club” far to large for the infraction. That said, bird strike reporting in Canada appears to be high largely because of the co-operation of Canadian carriers who operae the majority of flights in Canada. This co-operation is done without legislation forcing them to do so and is largely the result of Transport Canada’s previous wildlife hazard specialist’s devoted and effective efforts in educating airlines of the importance of wildlife strike reporting.

Recommendations

While strike reporting in Canada appears to be at a relatively high rate, there are urgent needs for improvement in a variety of areas. The solutions offered by the following recommendations are not cast in stone. However, the issues that they address are critical and need to be resolved through one method or another. My suggestions below are only one approach that could be considered.

1. The national strike data base needs to be cleaned up of its numerous errors, omissions and duplicates in order to be a credible source of strike data. Transport Canada should work with each airport to undertake this retrofit of the data base.

2. The strike data base should be made public and be available on-line. All records (although perhaps not all fields) should be available once they are complete (see point 3 below).

3. Airports, airlines (including their pilot and mechanical staffs), Nav Canada and Transport Canada need to have access to an interactive strike data entry system. The data system needs to be “WIKI-like” in that it should be editable with the history of all edits tracked, and a notice of each strike as it is entered or modified must be sent to all parties affected (e.g., airport, airlines, Transport Canada). When a strike is reported to Nav-Canada, an electronic strike report form should be automatically e-mailed to the pilot (through their airline) which, when completed is e-mailed or uploaded back to the strike recording system.

4. Bird strikes reported by Nav-Canada in CADORS needs to be integrated into the interactive data entry system so that notice of strikes to relevant parties is immediate and does not occur days after the event. CADORS is not a bird strike reporting platform and critical information such as species, numbers or even bird descriptions are generally not reported in CADORS. The strike data base should not have to rely solely on CADORS information for wildlife strike data.

5. Transport Canada needs to re-initiate an extensive pilot education program aimed at informing pilots and their airlines of the importance of strike reporting.