COLLECTION AND DISSEMINATION OF WILDLIFE STRIKE DATA
AT AIRPORTS FOR THE US FEDERAL AVIATION ADMINISTRATION
VIA THE WORLD WIDE WEB

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Abstract

Embry-Riddle Aeronautical University (Prescott, AZ, USA) was awarded a grant from the William J. Hughes FAA Technical Center in October 1999 to develop and maintain a web site dealing with a wide variety of airport safety wildlife concerns. Initially, the web site enabled users to access related topics such as wildlife management (at/near airports), bird identification information, FAA wildlife management guidelines, education, pictures, current news, upcoming meetings and training, available jobs and discussion/forum sections. In April 2001, the web site was augmented with an on-line wildlife strike report (FAA Form 5200-7). Upon submittal on-line, "quick look" email notifications are sent to concerned government personnel. The distribution of these emails varies as to whether there was damage, human injuries/fatalities, and whether feather remains were collected and will be sent to the Smithsonian Institution for identification. In July 2002, a real-time on-line query system was incorporated to allow federal and local government agencies, airport and operator personnel, and USDA and airport wildlife biologists to access this database (which as of Nov 2004 contains 66,816 researched strike reports added to at a rate of approximately 500 strike reports/month) to formulate strategies to reduce the hazards wildlife present to aviation. To date (January 2005), over 10,800 on-line real-time queries were processed. In June 2004, ERAU was authorized to develop a graphical interface to this on-line query system. This graphical interface will give analysts the ability to view strike patterns with a wide variety of variables including species, seasons, migration patterns, etc.

Keywords: on-line database, birdstrike reports – format, collection, dissemination, quick-look notification, species identification

1. Introduction
The FAA's Airport Wildlife Hazard Mitigation Website[1] was established by Embry-Riddle Aeronautical University (Prescott, AZ) in October 1999 under grant from the William J. Hughes FAA Technical Center in Atlantic City, NJ. The objectives of the website are:

- To provide the aviation community with a large variety of sources of information concerning the risks that wildlife present to aviation safety and associated topics.

- To provide a user-friendly interface whereby airport, flight, operations, safety, and/or maintenance personnel may report wildlife strikes (in many airports a daily occurrence) on-line.

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[1] Airport Wildlife Hazard Mitigation Home Page is located at **http://wildlife-mitigation.tc.faa.gov**. A mirror (redundant) site is located at **http://wildlife.pr.erau.edu**.

- To provide an on-line database of wildlife strike reports for dissemination of data to federal and local government agencies, airport managers, operator safety personnel, biologists, engine and airframe manufacturer personnel to analyze and develop strategies to reduce the risks wildlife present to aviation.

- To provide users an opportunity to register with the on-line community for electronic dissemination of items of interest, coming events and community news.

2. Sources Of Information

The website home page has 12 sections dedicated to providing a wide variety of information surrounding the hazards that wildlife present to aviation. These sections are:(1) General Information, (2) News, (3) Meetings, (4) Bird Identification, (5) R & D Activities, (6) Resources, (7) Education, (8)Training, (9) Jobs, (10) Forum, (11) Strike Photos, and (12) Feedback.

2.1 General Information

The General Information Section itself is sub-divided into 11 sub-sections as described below:

Overview of the Bird Strike Problem – Brief discussion of the wildlife/aircraft strike problem with links to more thorough discussions from a number of different sources including the FAA, Transport Canada and the Airline Pilots Association.

Wildlife Management Information – Discussion of a number of passive strategies to minimize wildlife on or near airports with links to a number of references.

Current Hazard Assessment Systems – Discussion and links to the two systems that are currently being used for estimating wildlife strike hazard: (1) the U.S. Air Force's Bird Avoidance Model (BAM), and (2) the Avian Research Laboratory's Avian Hazard Advisory System (AHAS). These tools provide information regarding bird strike risk, and allow pilots to make informed decisions about their routes with regards to wildlife strike risk.

Bird Identification Information – Discussion of the importance of species identification and proper procedures to submit unidentified remains to the Smithsonian Institution, Division of Birds. This service is provided without charge to all US registered aircraft regardless of the strike location and strikes at US airports regardless of carrier registration..

FAA Wildlife Strike Database – Links to Summary Reports of Strikes published by the FAA and USDA/Wildlife Services.

FAA Wildlife Management Guidelines – Currently contains a link to the Certified Airport Operator's responsibilities with respect to hazardous wildlife issues (14 CFR 139 Section 139.337).

International Bird Strike Information – Brief discussion of work being done by civilian and military activities outside of the US.

Research and Development – Detailed discussions of various ongoing R & D activities to minimize the risks wildlife present to aviation.

Education – Links to universities offering degree programs or other training/assistance in wildlife damage control and other topics related to wildlife hazard mitigation at airports.

Pictures – A sampling of photos showing the damage caused by collisions of aircraft with wildlife.

Resources – An extensive listing of documents, sites, papers, reports and associated material relating to the hazards wildlife present to aviation.

2.2 News

This area is dedicated to posting the most current news related to wildlife control and environmental issues at airports.

2.3 Meetings

This area is dedicated to posting/publicizing information about upcoming meetings dealing with topics related to wildlife control at airports.

2.4 Bird Identification

This area is an alternate link to the *Bird Identification Information* discussed above.

2.5 R & D Activities
This area is an alternate link to the *Research and Development* Activities discussed above.

2.6 Resources
This area is an alternate link to the *Resources* discussed above.

2.7 Training
This area is dedicated to posting/publicizing information about upcoming training events in wildlife management/wildlife control.

2.8 Jobs
This area is dedicated to the posting/publicizing information about available jobs related to airport wildlife control.

2.9 Forum
This area is dedicated to the posting of problems and/or ideas to brainstorm with other users of this site or other users who have encountered a similar problem.

2.10 Strike Photos
An alternate link to the *Pictures* (of aircraft damage due to wildlife strikes) discussed above.

2.11 Feedback
This area is dedicated to providing users an opportunity to provide feedback concerning questions, new material users have to offer, comments on existing material contained in the website, and reporting of technical problems users may encounter while browsing the site.

3. Strike Reporting
To develop strategies to minimize the risk wildlife present to civil aviation, reporting of all wildlife strikes is imperative[2]. Although no mandatory reporting requirement currently exists, any personnel aware of a collision between some wildlife and any aircraft, regardless of size, are encouraged to file a "Bird/Other Wildlife Strike Report" (FAA Form 5200-7) – Appendix A. This form is widely available in hard copy (and also through the web site) although electronic reporting is encouraged through the website as illustrated in Figure 1.

Figure 1 – Electronic Reporting Website Icons

Immediate reporting is desired since events and circumstances surrounding the strike are still fresh in the observer's mind. Note that provision is also provided where the submitter may revise the submitted electronic strike report as more facts become known; for example, time out-of-service, repair costs, etc. Once submitted electronically (either the original or revised report), an "Quick Look" email notification

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[2] Although the primary risks are birds, mammals such as deer, fox, and coyotes also present a significant risk.

(See Appendix B) is sent to concerned FAA and USDA/Wildlife Services personnel[3]. In the event of reported aircraft damage and/or personnel injury/fatality, additional email notifications are also automatically generated. The email contains a link to a mirror-formatted copy of the electronically submitted strike report that is immediately available to notified personnel. Bird Identification personnel at the Smithsonian Institution are also electronically notified if the submitter has collected any available remains and intends to forward these remains to the Smithsonian for identification. Species identification is considered a critical element in formulation of mitigation strategies. This service is provided without charge to all United States registered aircraft owners/operators, regardless of where the strike occurred, and to all aircraft owners/operators when the strike occurred at a US airport. On-line retrieval of all electronic strike reports filed since April 2001 is provided to all authorized FAA personnel for historical purposes.

Whether filed electronically or submitted hardcopy through the US Mail, all reports are thoroughly researched by the USDA/Wildlife Services personnel (Database Manager Ms. Sandra Wright/USDA) at the Sandusky (OH) Field Station. Each report is reviewed for completeness and accuracy (as well as possibly redundancy in the event multiple reports for the same incident are filed). When the report is sufficiently completed, the data is entered in the FAA National Wildlife Aircraft Strike Database that is currently maintained off-line in MS Office ACCESS format as shown in Figure 2. The database currently contains 66,816 documented and researched strike reports (as of January 2005) dating back to January 1990. Reports are currently added at a rate of approximately 6,000 per year. To provide a more thorough picture of strikes at commercial US airports, effort has been initiated to include military strikes reported at joint civilian/military airports. The database currently contains 8,400 USAF reported strikes.

Figure 2 – The FAA National Wildlife Aircraft Strike Database in ACCESS Format

Periodically (usually once per month), this database is uploaded on-line to a MySQL database which is available through the website to all authorized FAA, local government, airport, operator, biologists, engine and airframe manufacturer's personnel. In addition, summarized database information (without specific airport or operator identification) is available to the general public by species, by state and by year.

4. On-Line Database Access
To make the widest dissemination of the FAA National Wildlife Aircraft Strike Database available for analysis and to contribute to strategies to minimize the risk wildlife presents to aviation, the database was put on-line in July 2002. There are currently 8 separate entrances to the on-line database, seven of which require prior FAA authorization to access. The 8th is available to the general public without prior authorization. Depending on need, the various entrances present limited views of the database as a whole. The current available entrances are shown in Figure 3. Area 51 is a highly restricted access

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[3] Entry of the reported data into the FAA National Wildlife Aircraft Strike Database has been delegated to the USDA/Wildlife Services located at the Sandusky (OH) Field Station [1].

download area for the dissemination of the source ACCESS database to a small number of authorized agencies.

Figure 3 – On-Line Access (and Various Entrances) to the
FAA National Wildlife Aircraft Strike Database

Each entrance shown above has a variety of pull-down lists to create queries to access data contained in the database. As an example, Authorized Airport Personnel are presented a Login screen from which they select their airport and password as shown in Figure 4. If a user desires, the entered airport/password combination may be saved for future access. If the official name of the airport is not known and can't be readily found in the airport name pull-down lists, the user may select the 4 letter airport code from the airport code pull-down list.

After verification of the correct airport/password combination, the user is presented with a Query Selection Menu as shown in Figure 5. The user may then select 1 or more criteria of interest for a specific period and/or aircraft (or no criteria at all for all reported strikes). Note that the user may select the hits ordered by date (which is the default), as well as aircraft, runway, damage or species (the latter four not shown). In addition, the user may also select the ordering – ascending, descending, and, recently added, grouping by species (to be discussed later in this paper).

Figure 4 – Authorized Airport Personnel Login Screen

Figure 5 – Query Selection Menu for Authorized Airport Personnel (Typical)

Upon submittal, the user is presented with a list of "hits" that satisfy the selected criteria. For the criteria shown in Figure 5, the user would be shown a summary report as shown in Figure 6.

It should be noted that each of the hits has the Incident Date as a link to the individual strike report. Clicking on any of those hits would present the user to a limited view of the detailed strike report as shown in Figure 7[4].

Figure 6 – Example Hit Return (Partial) for the Query Selected in Figure 6

Figure 7 – Limited View of a Detailed Strike Report Selected from Figure 6

In addition, the user is presented an option (not shown) to download all returned hits which automatically load into MS Office EXCEL for detailed further analysis off-line. An example of the EXCEL download file in Figure 6 is shown in Figure 8.

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[4] FAA authorized personnel view the entire strike report. Other users have limited views depending on organization need.

As an additional option, the user may select a "Group By Species" Ordering from the Query Selection Menu. For this ordering, all hits are summarized by species for that airport. Also provided in the listing is the strike count for the listed species for the airport's state, the entire US and foreign strikes as shown in Figure 9.

Note that the number of strikes for each species for the previously selected airport is a link to a summary listing of hits for that species as shown in Figure 10. Many wildlife specialists find the "Group by Species" extremely useful to portray the relative frequency of strikes between species at a particular airport as well as outside the immediate airport location.

	A	B	C	D	E	F	G	H	I	J	K	L
	Ref Nr	Incident Da	Time of Da	Time	Damage	Aircraft	Runway	Height	Speed	Airport Co	Airport	Phase o
2	46982	1/22/2003	Day		N	EMB-145	4R	300	135	KORD	CHICAGO OHARE INTL	Approac
3	47123	2/16/2003	Day	1050	N	MD-80	9L	0	180	KORD	CHICAGO OHARE INTL	Take-off
4	47215	2/20/2003	Night	1800	M	B-737-700	22L	0	180	KORD	CHICAGO OHARE INTL	Take-off
5	47172	2/24/2003			N	A-320	27R			KORD	CHICAGO OHARE INTL	
6	47196	2/27/2003				UNKNOWN	4R			KORD	CHICAGO OHARE INTL	
7	47198	2/28/2003	Day	1219	N	B-737-800	04R	300	135	KORD	CHICAGO OHARE INTL	Approac
8	47390	3/24/2003			N	B-737-300				KORD	CHICAGO OHARE INTL	Climb
9	47437	3/27/2003				UNKNOWN	27L			KORD	CHICAGO OHARE INTL	
10	47435	3/27/2003				UNKNOWN	27L			KORD	CHICAGO OHARE INTL	
11	47557	4/1/2003			N	A-319				KORD	CHICAGO OHARE INTL	Approac

Figure 8 – Downloaded EXCEL Spreadsheet (Partial View)
from Summary Hit Return Shown in Figure 6

Selected Grouping Criteria:
Species: ALL
State: IL
Airport: CHICAGO OHARE INTL   **Airport ID:** KORD
Latitude: 41.98° (41° 58.8') N   **Longitude:** 87.9° (87° 54.3') W

Number of Species Returned: 74

Click the number of strikes for a summary listing of strikes for the associated species.

Species	State	Airport	Airport Strikes	State Strikes	US Strikes	Foreign Strikes
AMERICAN COOT	IL	KORD	1	1	28	0
AMERICAN CROW	IL	KORD	13	25	188	0
AMERICAN GOLDEN-PLOVER	IL	KORD	2	2	21	0
AMERICAN KESTREL	IL	KORD	56	200	888	0
AMERICAN REDSTART	IL	KORD	1	1	2	0
AMERICAN ROBIN	IL	KORD	2	9	216	1
AMERICAN WOODCOCK	IL	KORD	1	1	13	0

Figure 9 – "Group by Species" Screen (Partial) for the Selected Airport

The "Group by Species" hits may also be downloaded into EXCEL as shown previously. Each of the "hits" in Figure 10 may be selected to link to the limited detailed strike report as previously shown in Figure 7.

As of Janaury 2005, there have been over 10,800 on-line queries generated with the request distribution shown in Figure 11. (Please be aware Level IIF[5] (Government Agencies) was added in November, 2003.)

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[5] Levels indicate degree of access to detailed strike data. Level I is complete visibility to Federal Government organizations, Level II is limited visibility to state and local Governmental organizations and non-Governmental

Figure 10 – Example Hit Return List (Partial) for the "Grouping by Species" Query

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Figure 11 – On-Line Query Request Distribution (From July 22, 2001 to Sept 18, 2004)

5. On-Line Community

In order to disseminate items of interest including coming events and community news an On-Line Community has been established open to any visitor to our web site as shown in Figure 12.

Figure 12 – Web Site Invitation to Join the On-Line Community

Approximately monthly, an email newsletter is distributed to all registered personnel by a custom designed broadcast email program.

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organizations depending on organization requirements and Level III yet a more limited visibility available to the general public. Levels I and II are password protected unique to each organization.

Upon clicking the link shown in Figure 12, the user is presented a brief application as shown in Figure 13.

Figure 13 – Application to Join the On-Line Community

There are, as of November 2004, 239 members of the On-Line Community from a wide variety of domestic as well as foreign organizations. A sampling of the current membership is shown in Figure 14:

Figure 14 – Sampling of the "Wildlife" On-Line Community

6. Future Plans
Development is currently underway to augment the on-line database access with a graphical interface. In addition to a discrete listing of all strikes returned by the user's query, an option will be provided to show graphically all strikes superimposed on a map of the United States (including Alaska and Hawaii) as shown in the developer's concept screen shot shown in Figure 15. Development is anticipated to be complete in Spring 2005.

The map of the US will be clickable by State allowing the viewer to obtain a more detailed mapping of all airports within that state. This graphical interface will present to analysts the ability to view strike patterns with a wide variety of variables including species, seasons, migration patterns, etc.

Figure 15 – Developer's "Concept" Screen Shot – Superimposed Strikes on US Map

7. References

[1] *Memorandum of Agreement between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes*, dated December 17, 2004.

Appendix A - On-Line Bird/Other Wildlife Strike Report (FAA Form 5200-7 Electronic)

BIRD/OTHER WILDLIFE STRIKE REPORT

Form Approved OMB NO. 2120-0045

1. Name of Operator	2. Aircraft Make/Model	3. Engine Make/Model

4. Aircraft Registration	5. Date of Incident	6. Local Time of Incident
	mm / dd / yyyy	☐ Dawn ☐ Dusk ___ Hr ___ Min / ☐ Day ☐ Night ☐ AM ☐ PM

6A. Flight Number	6B. Wildlife/Bird Remains: ☐ Collected ☐ Sent to Smithsonian

7. Airport Name	8. Runway Used	9. Location if En Route *(Nearest Town/Reference & State)*

10. Height *(AGL)* ___ ft	11. Speed *(IAS)* ___ kts	

12. Phase of Flight
- ☐ A. Parked
- ☐ B. Taxi
- ☐ C. Take-off Run
- ☐ D. Climb
- ☐ E. En Route
- ☐ F. Descent
- ☐ G. Approach
- ☐ H. Landing Roll

13. Part(s) of Aircraft Struck or Damaged

	Struck	Damaged
A. Radome	☐	☐
B. Windshield	☐	☐
C. Nose	☐	☐
D. Engine #1	☐	☐
E. Engine #2	☐	☐
F. Engine #3	☐	☐
G. Engine #4	☐	☐

Bird(s) Ingested? ☐ (Check for Yes)

13. (Con't)

	Struck	Damaged
H. Propeller	☐	☐
I. Wing/Rotor	☐	☐
J. Fuselage	☐	☐
K. Landing Gear	☐	☐
L. Tail	☐	☐
M. Lights	☐	☐
N. Other	☐	☐

(Specify, if "N. Other" is checked)

14. Effect on Flight
- ☐ None
- ☐ Aborted Take-Off
- ☐ Precautionary Landing
- ☐ Engine Shutdown
- ☐ Other (Specify)

15. Sky Condition
- ☐ No Cloud
- ☐ Some Cloud
- ☐ Overcast

16. Precipitation
- ☐ Fog
- ☐ Rain
- ☐ Snow
- ☐ None

17. Bird/Other Wildlife Species

18. Number Seen and/or Struck

Number	Seen	Struck
1	☐	☐
2 - 10	☐	☐
11 - 100	☐	☐
more than 100	☐	☐

19. Size of Bird(s)
- ☐ Small
- ☐ Medium
- ☐ Large

20. Pilot Warned of Birds/Wildlife? ☐ Yes ☐ No

21. Remarks *(Describe damage, injuries, and other pertinent information)*

DAMAGE/COST INFORMATION

22. Aircraft time out of service: ___ hours	23. Estimated cost of repairs or replacement *(US $)* $ ___	24. Estimated other costs *(US $) (e.g., revenue loss, fuel, aircraft inspection, crew lodging or rescheduling, etc.)* $ ___
Reported by	Title	Date 9/19/04 (mm/dd/yy)
Phone	Email	

FAA Form 5200-7 (Electronic) Revised 8-22-2002

Appendix B – "Quick Look" Email Notification Upon Submittal of On-Line Strike Report

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▽ . Subject: Strike Report Submittal Notification
      From: A. R. Newman <newmana@erau.edu>
      Date: 2:53 AM

Strike Report Submittal:

Confirmation Number: 2004-9-19-025310

Distributed To: Ed Cleary/FAA, Michel Hovan/FAA, Paul Jones/FAA,
                Sandra Wright/USDA & Rich Yarges/FAA
Enter http://wildlife.pr.erau.edu/
for a formatted review of this Strike Report

                -or-

Enter http://wildlife.pr.erau.edu/                      for a menu of current
Strike Reports from which you may select this Strike Report. Make a note of the
Confirmation Number.

The following is a Quick Look of the transmitted data:

Operator=Comair
Aircraft=CRJ
Engine=
Registration=N492CA
Incident_Month=09
Incident_Day=18
Incident_Year=2004
Incident_Hour=10
Incident_Minute=30
Incident_Night=on                    Effect_Specify=
Incident_PM=on                       Sky_Overcast=on
Flight=DL5403                        Precip_None=on
Remains_Collected=on                 Species=unknown
Airport=HVN                          Birds_1_Struck=on
                                     Size_Medium=on
                                     Warned_No=on
                                     Remarks=
                                     Aircraft_Out_of_Service=0
                                     Cost_Repairs=0
                                     Cost_Other=
                                     Reported_Name=K. Ormond
                                     Reported_Title=Airport Operations Superv
                                     Reported_Date=9/19/04
                                     Reported_Phone=203-466-8844
                                     Reported_E_Mail=


                                     Location of Submittal

                                         Remote Address: 64.252.134.172
                                         Remote Host: 172.134.252.64.snet.net
                                         Submitting Program: /users/wildlife/public_ht
                                         Submitting Host: wildlife.pr.erau.edu

                                     A. R. Newman
                                     Webmaster, Airport Wildlife Hazard Mitigation Web:
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