

Protecting the Flying Public and Minimizing Economic Losses within the Aviation Industry

Technical, Operational, and Research Assistance
Provided by USDA APHIS Wildlife Services
to reduce Wildlife Hazards to Aviation - Fiscal Year 2008



Wildlife Biologists and technicians with the USDA APHIS Wildlife Services Program (WS) provided 160 staff years of service at 764 airports and military airbases in FY 2008 to reduce wildlife hazards to aviation. On a daily basis, WS personnel conduct Integrated Wildlife Damage Management Programs to minimize the risk posed by wildlife at airports. This qualified airport wildlife biologist is inspecting trash containers to ensure all garbage is inaccessible to gulls, starlings and other hazardous birds.

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U.S. Department of Agriculture
Animal and Plant Health Inspection Service, Wildlife Services
Airport Wildlife Hazards Program

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Technical, Operational, and Research Assistance by USDA-APHIS- Wildlife Services to reduce Wildlife Hazards to Aviation in FY 2008

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1. Why are aircraft collisions with wildlife a concern at airports?

Aircraft collisions with birds and other wildlife (wildlife strikes) are an increasingly serious economic and safety problem. Dolbeer and Wright (2008) estimated wildlife strikes (98% involving birds) cost the civil aviation industry in the USA about \$650 million per year, 1990-2007. Allan and Orosz (2001) estimated that bird strikes annually cost commercial air carriers over \$1.2 billion worldwide, 1999-2000. At least 229 people died and 210 aircraft were destroyed as a result of bird strikes with civil and military aircraft from 1988-February 2009 (Richardson and West 2000; Thorpe 2003, 2005; Dolbeer, unpublished data). An additional 18 civil aircraft have been destroyed by deer strikes in the USA since 1983 (Dolbeer and Wright 2008, Dolbeer, unpublished data). Efforts to reduce wildlife strikes need to focus on the airport because 74% of all reported bird strikes with civil aircraft in USA occur in the airport environment (at less than 500 feet above ground level [AGL]). Of the 26 transport aircraft that have been destroyed because of bird strikes since 1960 worldwide, 24 (92%) of the strikes occurred during take-off or landing at less than 500 feet AGL (Dolbeer 2008; Dolbeer, Unpublished Data).

2. Why is the wildlife-strike problem increasing?

Wildlife strikes have increased in the past 20 years because of a combination of expanding populations of many wildlife species that are

hazardous to aviation and increasing numbers of aircraft movements (Dolbeer and Eschenfelder 2003). For example, 13 of the 14 largest (>8 lbs) bird species in North America have shown significant population increases in the past 20 years. These species include Canada geese, white and brown pelicans, sandhill cranes, wild turkeys, and bald eagles. Populations of many other hazardous species, such as turkey vultures, snow geese, red-tailed hawks, ospreys, great blue herons, double-crested cormorants, and white-tailed deer, also have increased dramatically. Furthermore, most of these species have adapted to living in urban environments, including airports. In addition, birds are less able to detect and avoid the quieter turbofan-powered aircraft in use today compared to older, noisier aircraft (Burger 1983, Kelly et al. 2001). Commercial aircraft movements in the USA have increased at about 2% per year since 1980 (FAA 2009a).

Pelicans, cormorants and gulls represent bird species that can be hazardous to aviation.



3. Can airport authorities and managers be held liable for wildlife strikes?

Based on a summary of cases by MacKinnon et al. (2001), Dolbeer (2005), and Dale (2009) and legal reviews by Michael (1986), Wilkinson (1998), and Matijaca (2001, 2005), it is apparent that airport operators must exercise “due diligence” in managing wildlife hazards to avoid potentially serious liability issues. In the USA, the exercise of “due diligence” to manage wildlife hazards initially involves an assessment of wildlife hazards at the airport. Based on the assessment, a wildlife hazard management plan may need to be developed and implemented for airports that are “Part 139”-certificated by the Federal Aviation Administration (FAA, “Part 139”-certificated airports serve scheduled and unscheduled air carrier aircraft with more than 9 seats). The U.S. Code of Federal Regulations requires that these certificated airports experiencing hazardous wildlife conditions (as defined in 14 CFR Part 139.337) conduct formal Wildlife Hazard Assessments and develop Wildlife Hazard Management Plans as part of the certification standards. There are approximately 562 “Part 139”-certificated airports in the USA (FAA 2009b).

4. How does an airport manage wildlife hazards?

Managing bird and other wildlife hazards at airports is a complex, public-sensitive endeavor involving many species of wildlife governed by the Migratory Bird Treaty Act and various federal, state and local regulations. Because of the complexity and sensitivity involved in managing wildlife hazards, airports are required to employ professional biologists trained in wildlife hazard management at airports (14 CFR Part 139.337 and FAA Advisory Circular 150/5200-36 [FAA 2009c]) to assess hazards, provide training, and to assist in the development, implementation, and evaluation of wildlife hazard management plans. Such professionally developed and implemented management plans minimize the likelihood of catastrophic or major-damage wildlife strikes on an airport and provide crucial support during litigation in the aftermath of any significant strike event that might occur. Cleary and Dolbeer (2005) provide detailed information on

the development and implementation of these management plans as well as on FAA regulations and guidelines regarding wildlife hazards to aviation.

5. What role does USDA-APHIS-Wildlife Services (WS) play in managing wildlife hazards at airports?

The USDA-APHIS-WS program provides federal leadership for resolving conflicts between wildlife and people. The WS program, with professional biologists available for consultation and other services in all 50 States and U.S. Territories supported by the National Wildlife Research Center headquartered in Colorado, is internationally recognized for research and management programs in wildlife damage control.

The FAA, which has only 1 staff wildlife biologist to deal with wildlife hazards to aviation nationwide, relies on the WS program to provide professional assistance to airports. The FAA has a Memorandum-of-Understanding (MOU) with WS (signed in 1989, updated in 2005) stating that “FAA or the certificated airport may request technical support from WS to lessen wildlife hazards” (Cleary and Dolbeer 2005). In addition, the Department of Defense (DoD) has a similar MOU with WS (signed in 1990) for assistance with wildlife damage issues at DoD facilities (Cleary and Dolbeer 2005). Finally, the National Association of State Aviation Officials (NASAO) and WS have a MOU (signed in 2006) which states that “APHIS WS is available to render technical expertise and assistance to NASAO to seek a mutual goal of alleviating wildlife hazards to aviation.” Many wildlife hazard management programs on airports are developed, implemented or overseen by WS biologists. USDA-APHIS-WS receives no appropriated federal funding to deal with wildlife hazards at airports but is authorized by the U.S. Congress to enter into cooperative service agreements with airport authorities and other entities to provide services on a cost-reimbursable basis.

5a. Managing wildlife hazards at air bases and airports is a specialized, public-sensitive activity: are WS biologists qualified and trained to work in this environment?

In 1996, WS developed a 3-day Airport Training Course for WS biologists to ensure that employees conducting work at airports understood the airport environment and the regulations, policies, and agency roles for both military and civil aviation. As of January 2009, 420 WS biologists have successfully passed this FAA-approved course (FAA 2009c) of which 374 are current employees. Additionally, because WS biologists address wildlife damage management issues throughout the USA and abroad (see section 5b below), WS possesses a network of experienced employees to exchange information regarding wildlife damage management techniques, especially those best suited for issues arising at airports. In addition, WS biologists working at airports and airbases are supported by USDA-APHIS-WS's National Wildlife Research Center (see section 5g below).

5b. At how many airports did WS biologists provide assistance in reducing wildlife hazards in 2008?

The number of civil and military airports requesting assistance from WS has steadily grown over the past 19 years in concert with increasing levels of wildlife hazards (Fig. 1). WS assistance grew from 42 airports in 1990^a to a record 764 airports in 2008 (Fig. 1). In 2008, WS biologists provided 160 staff-years of assistance at 561 civil, 122 civil-military joint use, and 81 military airports in 50 states, 3 U.S. territories, and 6 foreign countries (Table 1). Assistance was provided at 387 (69%) of the 562 "Part 139"-certificated airports in the USA (Table 2). The 387 certificated airports where WS provided assistance served 648 million commercial passengers and recorded 21.8 million commercial aircraft movements and 17.8 million general aviation (GA) aircraft movements in 2008 (Table 3). The 296 non-certificated civil airports where WS provided

assistance recorded 10.6 million GA aircraft movements.



APHIS WS has over 300 personnel trained per Federal Aviation Administration standards to assist airports with wildlife hazards.

5c. What types of assistance were provided by WS biologists at airports to reduce wildlife hazards in 2008?

WS biologists provided a wide range of technical and direct management assistance at airports (Tables 4, 5). Consultations with airport authorities regarding wildlife issues was the most common technical service provided (738 airports) followed by training of airport personnel in wildlife identification and control methods (296 airports involving 2,195 personnel). Other technical assistance provided included Wildlife Hazard Assessments, development of Wildlife Hazard Management Plans, and Environmental Assessments (174, 132, and 102 airports, respectively).

Direct management assistance included lethal control of hazardous wildlife (256 airports), non-lethal dispersal of hazardous wildlife (242 airports), modification of habitats to discourage wildlife (193 airports), and capture and translocation of wildlife away from the airport (81 airports, Table 4). Lethal control of protected species was done under state and federal permits as a last option after non-lethal options had been determined to be ineffective or impractical.

^a Years refer to Federal Fiscal Years (e.g., 1990 = 1 Oct 1989-30 Sep 1990).

5d. At how many airports did technical or direct management assistance by WS biologists result in a reduction, suppression, or prevention of hazards caused by wildlife in 2008?

WS biologists estimated that technical or direct management assistance resulted in a reduction, suppression, or prevention of wildlife hazards at 582 (76%) of the 764 airports where some type of assistance was provided (Table 6). This total included 323 (83%) of the 387 “Part 139”-certificated airports assisted. These estimates of successful intervention are conservative. WS biologists indicated that there was insufficient time since management actions had been implemented or insufficient information from airport personnel to assess whether or not hazards had been reduced, suppressed, or prevented on 17, 27, and 21 airports, respectively. Wenning et al. (2004) and Dolbeer et al. (2007) provided summaries of specific accomplishments by WS biologists at airports and airbases nationwide in reducing wildlife hazards since 1990.

5e. Besides technical and direct management assistance at airports, what other roles does WS play in mitigating wildlife hazards to aviation?

WS biologists working at airports and airbases are supported by USDA-APHIS-WS’s National Wildlife Research Center (NWRC). NWRC has a field station (Sandusky, OH) devoted to applied research in methods to mitigate wildlife hazards to aviation. Numerous research collaborations involving NWRC have occurred or are ongoing at civil and military aviation facilities through interagency and cooperative agreements with other government agencies, airports and

private companies (Table 7). In addition, WS, through an interagency agreement with the FAA, manages the National Wildlife Strike Database which contains over 84,000 reports of wildlife strikes with civil aircraft in USA, 1990-2008. The National Wildlife Strike Database provides the scientific foundation for research and management activities related to wildlife and aviation (Dolbeer and Wright 2008).

6. Conclusions

Because of expanding populations of many wildlife species that are hazardous to aviation and the adaptation of these species to urban environments, wildlife hazards are increasing at both civil and military airports worldwide. In response to these expanding conflicts, USDA-APHIS-WS has developed a national network of professional wildlife biologists who are highly qualified and specifically trained to deal with these unique, complex and public-sensitive challenges. As documented in this report, WS provides substantial assistance and effective, science-based mitigation for a variety of wildlife hazard issues at airports. However, a major challenge facing WS, in both the civil and military arenas, is that no Congressional or departmental (i.e., command level) funding is available to provide a foundation for wildlife hazard mitigation work. Thus, assistance provided by WS is often limited by the availability of funds by co-operators on an annual basis. In many situations, WS is unable to address significant wildlife hazard issues requested and desired by cooperators because no funding or insufficient funding is available to do the necessary work.

Langley Air Force Base, Virginia 2008 – APHIS WS personnel at “Managing Wildlife Hazards at Airports” training session. This training ensures that APHIS WS personnel are qualified professionals as per Federal Aviation Administration standards.



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Table 1. Staff-years expended and number of civil, civil/military joint-use, and military airports served by USDA-APHIS-Wildlife Services (WS) biologists in provision of technical and direct management assistance to reduce wildlife hazards to aviation, FY 2008.

State/ Terr.	WS staff years	Number of airports assisted				State/ Terr.	WS staff years	Number of airports assisted			
		Civil	Joint use	Mili- tary	Total			Civil	Joint use	Mili- tary	Total
AK	9.58	25	7	4	36	ND	0.13	11	1	2	14
AL	2.28	4	6	2	12	NE	4.00	1	1	1	3
AR	1.01	2	0	1	3	NH	0.55	5	1	0	6
AZ	1.16	4	1	2	7	NJ	1.86	9	1	2	12
CA	8.65	22	2	5	29	NM	0.12	1	1	2	4
CO	7.25	9	2	2	13	NV	0.50	1	0	0	1
CT	0.57	6	3	0	9	NY	2.07	14	7	0	21
DE	0.40	1	1	1	3	OH	3.26	26	6	1	33
FL	6.99	25	4	9	38	OK	7.44	8	6	3	17
GA	1.27	10	0	3	13	OR	0.11	8	5	0	13
GU ^a	1.42	5	1	1	7	PA	4.05	21	5	2	28
HI	25.90	10	3	3	16	PR	0.01	0	1	0	1
IA	5.76	31	2	0	33	RI	0.16	4	1	0	5
ID	0.10	2	1	1	4	SC	2.07	4	1	3	8
IL	4.64	21	4	0	25	SD	0.29	11	2	0	13
IN	1.94	18	2	1	21	TN	1.46	3	4	0	7
KS	1.04	16	1	0	17	TX	5.35	8	7	4	19
KY	2.85	7	1	1	9	UT	0.77	7	2	1	10
LA	0.03	9	0	2	11	VA	9.07	12	2	5	19
MA	1.58	9	3	1	13	VI	0.01	0	1	0	1
MD	1.08	5	1	2	8	VT	0.60	5	1	0	6
ME	0.57	10	1	1	12	WA	5.28	16	5	2	23
MI	0.57	37	2	1	40	WI	1.36	22	2	1	25
MN	2.42	24	3	0	27	WV	0.82	7	1	0	8
MO	5.10	7	2	1	10	WY	0.37	5	1	0	6
MS	5.57	1	2	1	4	Foreign ^b	0.01	6	0	0	6
MT	0.13	5	1	1	7						
NC	8.05	21	1	6	28	Total	159.59	561	122	81	764^c

^a Includes 4 airports in Pacific Islands that are part of U.S. Commonwealth.^b Pacific Island nations.^c For comparison, WS biologists provided assistance on 42 airports in FY 1990, 193 in 1998, 396 in 2001, 544 in 2002, 565 in 2003, 636 in 2004, and 674 in 2005, 2006, and 714 in 2007 (see Fig. 1).

Table 2. Number of civil or joint-use (JU) “Part 139”-certificated airports, civil or JU non-certificated airports, and military airbases requesting assistance from USDA-APHIS-Wildlife Services for wildlife hazard issues, FY 2008.

Airport class (14 CFR Part 139)	Number (%) of airports re- questing assistance
Civil/JU “Part 139”-certificated ^a	387 (51)
Civil/JU non-certificated	290 (39)
Military ^b	81 (10)
Foreign	6 (<1)
Total	764 (100)

^a The U.S. Code of Federal Regulations (14 CFR Part 139) requires the Federal Aviation Administration (FAA) to issue airport operating certificates to airports that serve scheduled and unscheduled air carrier aircraft with more than 9 seats or that the FAA Administrator requires to have a certificate. “Part 139”-certificated airports experiencing hazardous wildlife conditions as defined in Part 139.337 must conduct formal Wildlife Hazard Assessments and develop Wildlife Hazard Management Plans as part of the certification standards. In 2008, there were approximately 562 “Part 139”-certificated airports in the USA (FAA 2009b).

^b Two of the 81 military airbases requesting assistance hold Part 139 certificates.

Table 3. Number of passenger enplanements and aircraft movements in 2008 (FAA 2009a) at 387 “Part 139”-certificated civil airports and 296 non-certificated civil airports requesting assistance from USDA-APHIS-Wildlife Services for wildlife hazard issues, FY 2008.

Airport class (14 CFR Part 139)	Number of passenger en- planements	Aircraft movements (departures and arrivals)			
		Com- mercial	General aviation ^a	Military ^a	Total
“Part-139”- certificated (360)	647,876,629	21,819,331	17,780,669	2,196,044	41,796,044
Non- certificated (279)	1,879,090	607,517	10,601,851	324,256	11,533,624
Total	649,755,719	22,426,848	28,382,520	2,520,300	53,329,668

^a Includes itinerate and local (take off and land at same airport) movements. Over 2.2 million aircraft movements at 81 military airbases are not included in these totals.

Table 4. Types of technical and operational (direct management) assistance provided by USDA-APHIS-Wildlife Services biologists to reduce wildlife hazards at airports, FY 2008.

Category of assistance	Type of assistance to reduce wildlife hazards	Number of airports	% of total airports assisted (n = 764)
Technical	Consultation regarding wildlife issues	738	97
	Training of airport personnel	296 ^a	39
	Wildlife Hazard Assessment	174	23
	Wildlife Hazard Management Plan	132	17
	Environmental Assessment	102	13
	Total Technical Assistance	738	97
Direct management	Lethal control of hazardous wildlife	256	34
	Non-lethal dispersal of hazardous wildlife	242	32
	Habitat modification	193	25
	Live-trap/ translocation of wildlife from airport	81	11
	Total Direct Management Assistance	336	44

^a Number of airports where training took place; personnel from additional airports attended some of these training courses (See Table 5).

Table 5. Number of airports where technical training was provided in the identification and management of wildlife hazards to aviation and total airport personnel trained by USDA-APHIS-Wildlife Services biologists, FY 2008.

State	Number of airports ^a	Number of persons trained	State	Number of airports ^a	Number of persons trained
AK	32	98	ND	6	20
AL	12	46	NE	3	0
AR	0	0	NH	3	26
AZ	1	8	NJ	3	64
CA	3	21	NM	0	0
CO	7	100	NV	1	3
CT	5	22	NY	19	168
DE	0	0	OH	14	83
FL	3	16	OK	9	83
GA	1	9	OR	7	35
GU	4	16	PA	10	139
HI	6	3	PR	0	0
IA	6	51	RI	4	8
ID	1	7	SC	0	0
IL	15	83	SD	4	16
IN	11	35	TN	4	23
KS	7	39	TX	3	34
KY	1	22	UT	10	54
LA	1	5	VA	7	80
MA	5	56	VI	1	3
MD	2	31	VT	3	19
ME	5	28	WA	11	136
MI	14	41	WI	5	53
MN	5	57	WV	3	17
MO	7	96	WY	0	0
MS	2	5	Foreign	0	0
MT	2	27			
NC	8	209	Total	296^a	2,195^b

^a Personnel from several airports sometimes attended training courses provided by WS at an airport; thus, total airports from which personnel received training is greater than indicated.

^b In comparison, WS biologists provided training for 1,133 airport personnel in 2002, 1,418 in 2005, 1,739 in 2006, and 2,055 in 2007.

Table 6. Number of “Part 139”-certificated airports, non-certificated airports, and military airbases at which technical or direct management assistance by USDA-APHIS-Wildlife Services (WS) biologists resulted in a reduction, suppression, or prevention of hazardous conditions caused by wildlife, FY 2008.

	Number of airports (% of total airports assisted)			
	“Part 139”- certificated civil airports (n = 387 ^a)	Non-certificated civil airports (n = 296)	Military air-bases (81)	All airports (n = 764)
Reduction of hazards from target wildlife species ^b	289 (75)	170 (58)	61 (75)	520 (68)
Suppression of hazards from target wildlife species ^c	280 (72)	147 (50)	56 (69)	483 (63)
Prevention of hazards from target wildlife species ^d	206 (53)	104 (35)	40 (49)	350 (46)
Reduction, suppression, or prevention of hazards from target wildlife	323 (83)	194 (66)	65 (80)	582(76)^{e f}

^a Includes 6 civil airports in foreign countries (Table 1).

^b As examples, airport installed anti-perching devices or removed vegetation attractive to hazardous wildlife because of WS recommendation; WS successfully initiated program to remove hazardous wildlife from the airport.

^c Successful WS direct management activities or technical assistance recommendations initiated in previous years were continued or maintained in 2008 (e.g., continued management of vegetation, continued removal of deer as a follow-up to more extensive removal initiated in earlier year to initially get problem under control).

^d WS recommendation or intervention resulted in prevention of development or activity that would have resulted in increased wildlife numbers at airport (e.g., prevention of on-airport wetland mitigation, landfill expansion near airport, or planting of landscape vegetation attractive to wildlife).

^e These estimates of successful intervention are conservative because WS biologists indicated that there was insufficient time since management actions had been implemented or insufficient information from airport personnel to assess whether or not hazards had been reduced, suppressed, or prevented on 17, 27, and 21 airports, respectively.

^f For comparison, WS biologists estimated that technical or direct management assistance resulted in a reduction, suppression, or prevention of hazards from target wildlife at 409 airports in 2002, 441 airports in 2003, 479 airports in 2004, 483 in 2005, 518 in 2006, and 548 in 2007.

Table 7. Research and related activities by USDA-APHIS-Wildlife Services (WS) to support technical and direct management assistance efforts at airports to mitigate wildlife hazards to aviation, FY 2008.

WS research and related activities to support airport wildlife hazard mitigation efforts (primary location of work)	Sponsor of work
Management of National Wildlife Strike Database (Ohio)	FAA
Research on habitat management; wildlife control and monitoring technologies at airports (Ohio and nationwide)	FAA ^a
Evaluation of exclusion devices for storm water ponds at airports (North Carolina)	State
Movement/ migration of osprey translocated from airports (Virginia)	DOD ^b
Movement/ migration of vultures (South Carolina)	Navy
Canada Goose movements using satellite telemetry (North Carolina)	State
Translocation of Bald Eagles (Minnesota)	FAA
Evaluation of bird-detecting radar (North Carolina)	DOD ^c
Storm water management at airports (Alabama)	FAA
Attraction of commercial food-waste composting sites to wildlife hazardous to aviation (Ohio)	Private

^a Research in FY2008 included earthworm control, ground cover management, resident Canada goose movements related to airports, exclusion devices, and wildlife risk assessment.

^b Department of Defense (DOD) Legacy Natural Resources Management Program.

^c DOD Environmental Security Technology Certification Program (DOD ESTCP; WS is a partner with FAA, U.S. Navy, Academia, and private companies in a research project to evaluate bird-detecting radars).

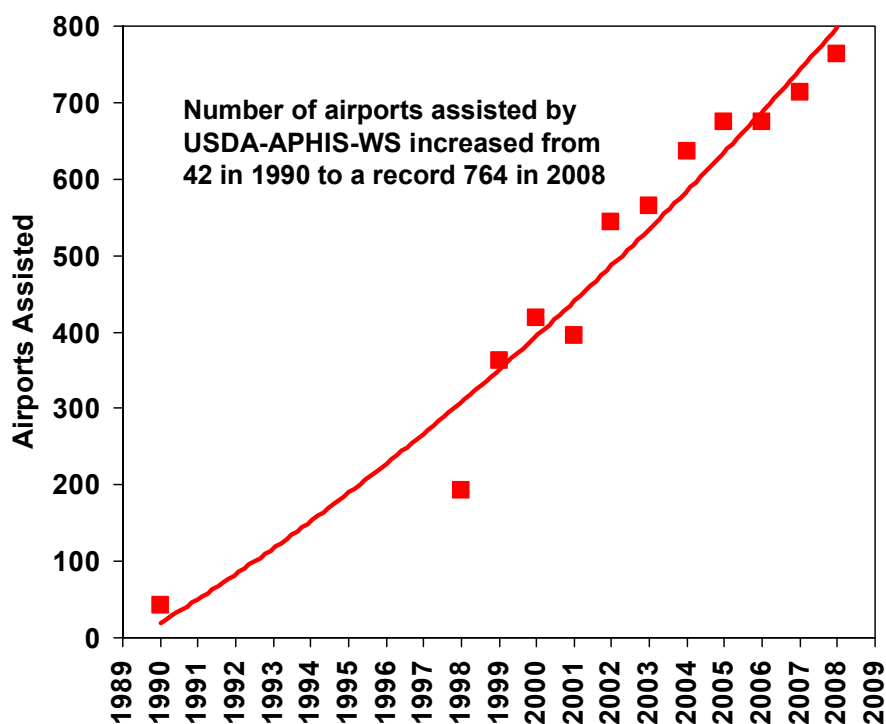


Figure 1. The number of airports served by USDA-APHIS-Wildlife Services (WS) in provision of technical and direct management assistance to reduce wildlife hazards, 1990-2008. In 2008, WS personnel provided 160 staff-years of assistance at 764 airports (561 civil, 122 joint military-civil use, and 81 military) in all 50 U.S. States and 3 U.S. Territories (see Table 1).