United States Department of Agriculture

Forest Service

FY 2003

Aviation Safety Summary

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Boise, ID

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NOTE: Formulas used: Industry standard "per 100,000 hours flown"

Accident Rate = Number of accidents divided by the number of hours flown times 100,000.

Fatal Accident Rate = Number of fatal accidents divided by the number of hours flown times 100,000.

Fatality Rate = Number of fatalities divided by the number of hours flown times 100,000.

Departure Accident Rate = Number of accidents divided by the number of departures times 100,000

Executive Summary
Systems Safety – Re-defining a Core Value

Safety, as a stand-alone principle is ambiguous and subject to wide interpretation. We have identified a means to focus on systems safety as a corporate safety culture, which includes interagency cooperation in key risk management arenas, realizing the true core of the Aviation Safety program. The National Aviation Safety Center (NASC) is dedicated to the support of the Forest Service aviation program needs with safety information, lessons learned, risk management tools, safety training, accident prevention, all focused on our ultimate goal of eliminating mishaps.

What is the culture of systems safety?

System; A group of interrelated processes which are a composite of people, procedures, materials, tools, equipment, facilities, and software operating in a specific environment to perform a specific task or achieve a specific purpose, support, or mission requirement for an air carrier.

System Safety; The application of special technical and managerial skills to identify, analyze, assess and control hazards and risks associated with a complete system. System safety is applied throughout a system's entire lifecycle to achieve an acceptable level of risk within the constraints of operational effectiveness, time, and cost.

System Approach; The structured, safety-driven means by which the USFS will certify and survey elements that are designed to interact predictably within the USFS system and sub-systems form the foundation of this management strategy.

What is a sub-system? Training program is a sub-system by which the USFS ensures personnel are trained to perform assigned duties in accordance with the USFS approved training program. (this is an example of a sub-system)

Safety Attributes; The authority, responsibility, procedures, controls, process and measurements, and interfaces that the USFS has designed into its systems.

"As a world-class leader in natural resources management, the Forest Service has a responsibility to protect its most valuable resource – our personnel. The success of our mission depends upon how effectively we incorporate safety and health into our culture and our daily behavior."

We invite you to study this FY 2003 Accident Review and to benefit from the lessons learned. For more about the USDA Forest Service Aviation Safety program, visit the NASC website at www.fs.fed.us/fire/aviation_safety.

R.G. "Ron" Hanks
National Aviation Safety and Training Manager

Aircraft Program Administration

Approximately 160 employees at the Washington Office and Regional levels administer the Forest Service aviation program. The national staff is located in Washington D.C. and at the National Aviation Safety Center in Boise, Idaho. The vast majority of aviation personnel are located at nine regional operations centers around the United States, providing day-to-day operational oversight and program guidance.

The Forest Service annually operates approximately 850 aircraft. These include government owned, chartered, leased, and contractor operated aircraft. The Forest Service owns approximately 250 aircraft and operates 42 aircraft (40 fixed-wing and 2 helicopters.) Over 200 Forest Service owned aircraft are operated by numerous states under the Federal Excess Personal Property (FEPP) program. Approximately 800 helicopters and fixed wing aircraft of various makes and models are chartered, leased or contracted including a vintage fleet of multi-engine airtankers. The aircraft are inspected and "carded" for government use by interagency inspectors, and are flown and maintained by the contractors.

Aviation Safety Accomplishments

After the devastating year in 2002, we were actively looking for ways to improve aviation safety in 2003, starting with changing our safety culture.   We focused on increased training and improving risk management processes.

Accomplishments achieved in aviation safety in 2003 included:
- Implemented the National Aviation Safety Plan
- Revised the FSM 5720
- Produced Aviation Safety Lessons Learned packages and distributed to airtanker and helicopter contractors
- Created the National Aviation Safety Center
- Established the new National Aviation Safety Center website
- Combined SAFECOM system with DOI – Aviation Management
- Increased involvement in Interagency Aviation Training ACE courses and steering committee
- Tested and received support for implementation of Automated Flight Following in 2004
- Created Accident/Incident database
- Generated and distributed eight Safety Alerts
- Produced and distributed three Safety Summaries during the fire season
- Produced and distributed three Airward News letters
- Proposed National Aerial Firefighting Academy (NAFA) Improvements & MOU for joint support with BLM
- Implemented the Fire Traffic Area (FTA) proposal from Region 5
- Eliminated operations with high-risk airtankers
- Reduced exposure through new direction on airtanker utilization
- Grounded leadplanes and smokejumper aircraft for evaluation of suspected safety concerns
- Addressed concerns about operational parameters
- Installed safety equipment (TCAS & AFF)
- Explored methods for helicopter safety enhancements
- Represented USDA at GSA Interagency Committee for Aviation Policy
- Proposed interagency MOU to improve airspace coordination and management on wildland fire operations
- Participated in National Safety and Health Council and Fire Operations Safety Council meetings
- Participated in Regional Fire Directors meetings to keep them informed of developing aviation safety issues
- Participated in Aviation Management Council and Aviation Operations Oversight Team
- Participation in NIFC Fire and Aviation Safety Team

Statistical Summary

The accident rate for fiscal year 2003 was less than half of the 15 year average. We experienced 3 accidents and 9 "Incidents with Potential" (IWP). Unfortunately, we did not make it through the year without any fatalities. The pilot and helicopter manager were fatally injured in the helicopter accident involved in the recovery effort for the space shuttle Columbia. The USFS flew 96,055 hours, which was 17,431 hours above the 15 year average.

The Forest Service utilizes aircraft mainly for fire suppression. The **primary** mission of USDA Forest Service Aviation is to support the ground firefighter through a variety of means, including, but not limited to:

- ✓ Aerial delivery of firefighters by parachute, rappel line, or on site landing
- ✓ Air tactical command and control
- ✓ Firefighter transport
- ✓ Surveillance, reconnaissance, and intelligence gathering
- ✓ Aerial delivery of fire retardant and water

Aircraft are also used for a wide variety of other missions, including administration, research, forest rehabilitation, forest health, law enforcement, aerial photography, and infrared surveillance.

This year we have added a new metric for analysis of risk. The number of accidents per 100,000 departures (Departure Accident Rate) has been included as a tool for comparing the frequency of exposure to risk (number of departures) with the amount of time at risk (number of flight hours). This comparison will assist with the recognition of hazardous trends and aid in accident prevention efforts.

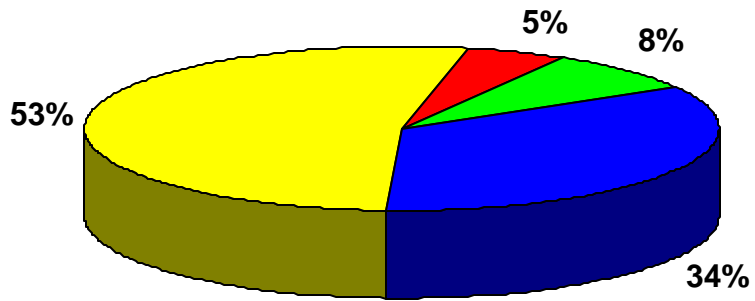# USFS Aircraft Accident Rates 1987 to 2003
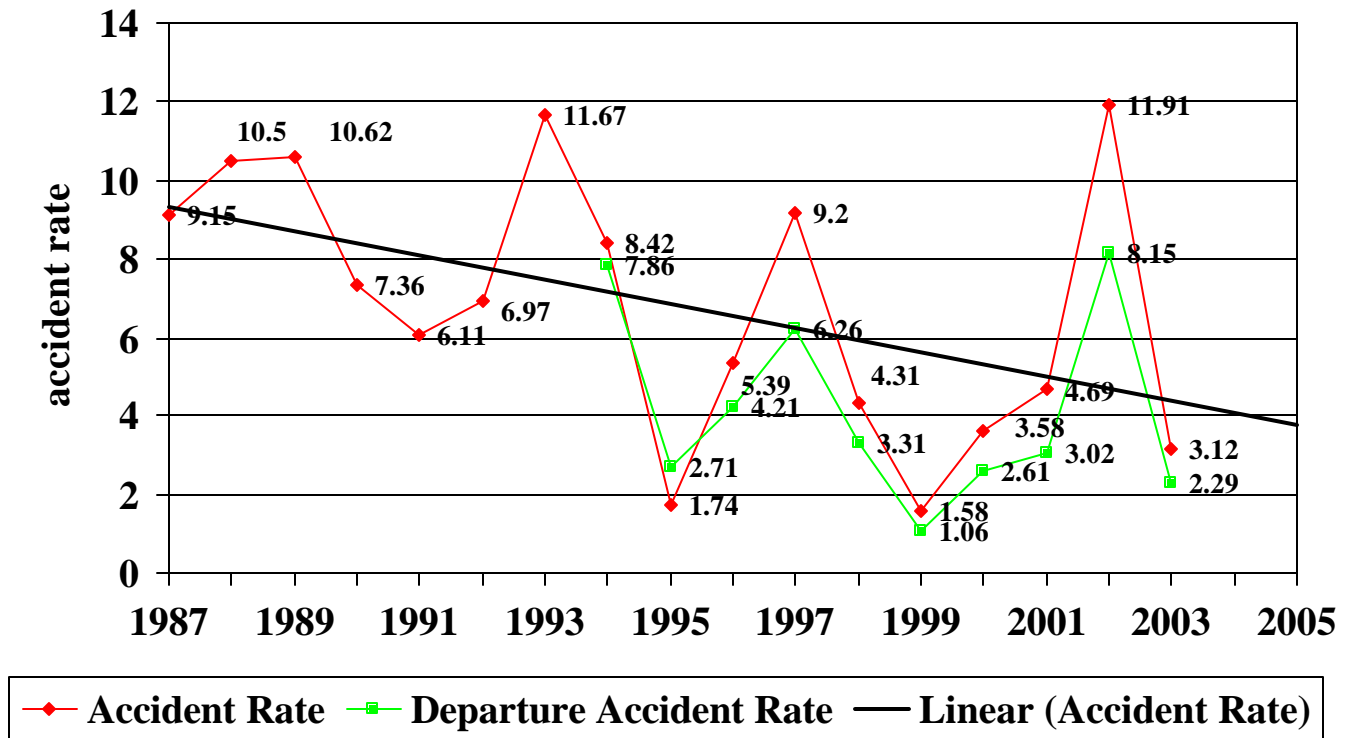
FY 2003 Accident Statistics

Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
Fixed-Wing	32,704	1	3.05	0	0	0	0
Helicopter	50,662	2	3.94	1	1.97	2	3.94
Airtanker	5,082	0	0	0	0	0	0
USFS Owned	7,607	0	0	0	0	0	0
Total	96,055	3	3.12	1	1.04	2	2.08

The actual hours flown in FY 2003 were above the fifteen-year average number of hours (78,624). Analysis of the data shows an increase (+17,431) in total number of hours flown.
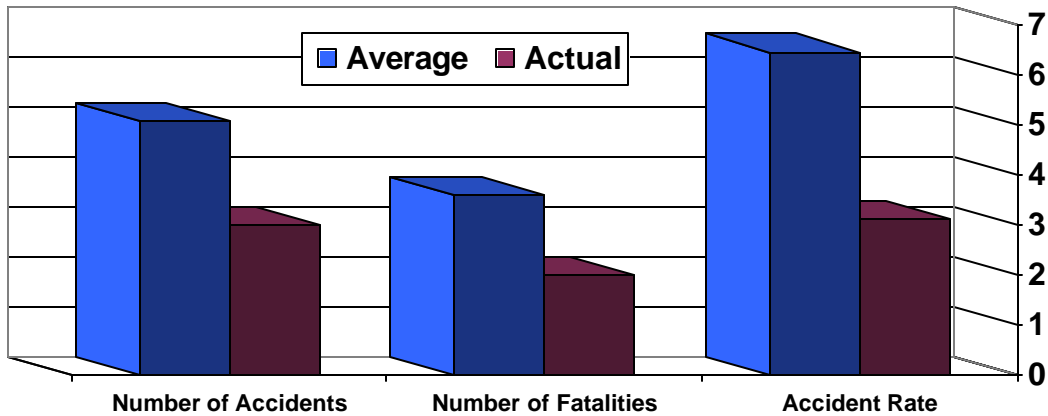
Average vs Actual Hours Flown for FY 2003

78,624   96,055

| | 100,000 | 80,000 | 60,000 | 40,000 | 20,000 | 0 |
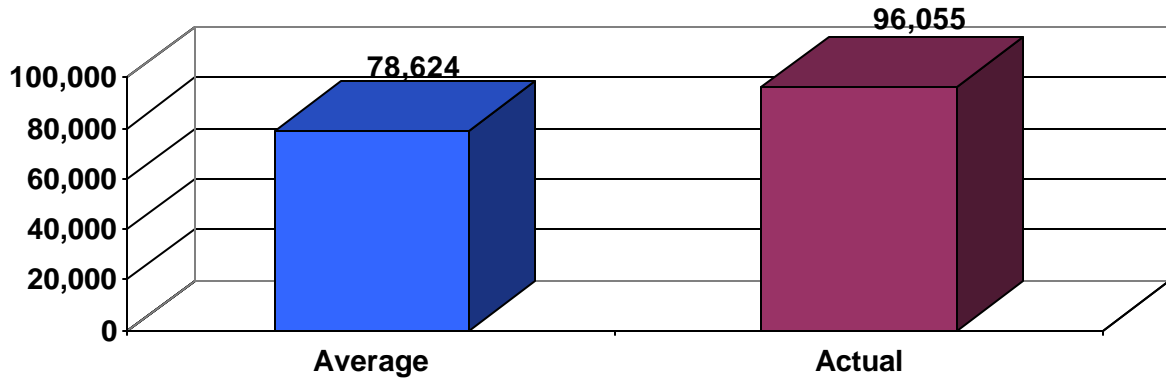
Average   Actual

FY03 Flight Hour Percentages

5%   8%

53%

34%

■ Fixed-Wing ■ Helicopter ■ Airtanker ■ USFS Owned

Average vs Actual for FY 2003


Comparison of Averages FY 1989-2003			
	15 Year Average	Actual	Comparison
Hours flown	78,624	96,055	+17,431
Number of Accidents	5.07	3	-2.07
Number of Fatalities	2.4	2	-.4
Accident Rate	6.44	3.12	-3.32

15-Year Flight Hour Statistics

| Flight Hours:					
Fiscal Year	Fixed Wing	Helicopter	Airtanker	USFS Owned	Total
2003	32,704	50,662	5,082	7,607	96,055
2002	33,011	54,427	8,573	13,052	109,063
2001	26,580	39,497	7,832	11,241	85,150
2000	34,976	53,145	10,616	12,749	111,486
1999	21,873	25,174	6,069	10,019	63,135
1998	32,416	24,423	3,685	9,055	69,579
1997	16,753	16,295	2,801	7,608	43,457
1996	31,919	36,307	8,407	11,648	88,281
1995	23,406	20,031	4,154	9,883	57,474
1994	44,995	49,200	10,100	14,405	118,700
1993	19,824	12,026	1,947	9,037	42,834
1992	28,793	27,973	5,147	9,847	71,760
1991	27,056	26,032	2,782	9,610	65,480
1990	39,389	27,309	4,446	10,396	81,540
1989	34,450	25,749	5,337	9,829	75,365
15-year totals	448,145	488,250	86,978	155,986	1,179,359
Averages	29,876	32,550	5,799	10,399	78,624

Accident Rates by Flight Hours Vs. Departure

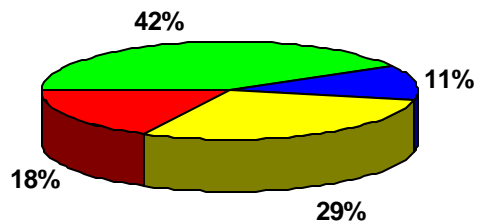## 15 Year Average of Flight Hour Percentages
1989-2003

7%   13%

42%

38%
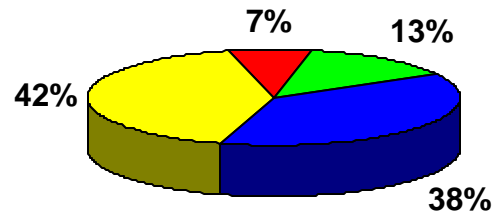
■ Fixed-Wing   □ Helicopter   ■ Airtanker   ■ USFS Owned

15 Year Average Accident Rate
Percentages 1989-2003

20%

37%   8%

35%
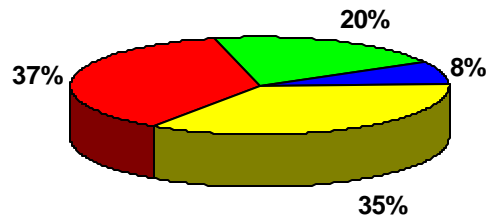
■ Fixed-Wing   □ Helicopter   ■ Airtanker   ■ USFS Owned

10 Year Average Departure Accident Rate
Percentages 1994-2003

42%

11%

18%

29%

■ Fixed-Wing   □ Helicopter   ■ Airtanker   ■ USFS Owned

Total Accident Rates

Year	Total Number of Accidents	Total Accident Rate	Fixed-Wing Accident Rate	Helicopter Accident Rate	Airtanker Accident Rate	USFS Owned Accident Rate
2003	3	3.12	3.05	3.94	0.00	0.00
2002	13	11.91	3.02	14.69	23.32	15.32
2001	4	4.69	3.76	5.06	0.00	0.00
2000	4	3.58	2.85	3.76	0.00	7.84
1999	1	1.58	0.00	3.97	0.00	0.00
1998	3	4.31	3.08	4.09	27.14	0.00
1997	4	9.20	0.00	24.55	0.00	0.00
1996	5	5.66	0.00	11.02	0.00	8.59
1995	1	1.74	0.00	0.00	24.07	10.12
1994	10	8.42	2.22	14.23	9.90	6.94
1993	5	11.67	15.13	8.31	51.34	0.00
1992	5	6.97	0.00	14.29	19.43	0.00
1991	4	6.11	0.00	7.86	0.00	20.81
1990	6	7.36	0.00	18.31	22.49	0.00
1989	8	10.62	2.90	19.42	18.74	10.17
15-year Average	5.07	6.44	2.23	9.83	10.34	5.76

Total Fatal Accident and Fatality Rates

Year	Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
2003	1	3.12	2	1.04
2002	3	2.75	5	4.58
2001	0	0.00	0	0.00
2000	1	0.89	2	1.79
1999	0	0.00	0	0.00
1998	2	2.87	4	5.75
1997	1	4.60	2	4.60
1996	0	0.00	0	0.00
1995	2	1.74	3	5.22
1994	4	2.53	6	5.05
1993	2	4.67	6	14.01
1992	1	1.39	2	2.79
1991	2	3.05	2	3.05
1990	1	1.22	2	2.45
1989	0	0.00	0	0.00
15-year Average	1.33	1.69	2.4	3.05

10-Year Departure Data
Number of Departures by Year and Aircraft Type

Number of Departures:					
Fiscal Year	Fixed Wing	Helicopter	Airtanker	USFS Owned	Total
2003	39,643	74,133	11,463	5,545	130,784
2002	42,581	87,387	20,553	8,932	159,453
2001	34,427	70,503	19,382	8,015	132,327
2000	40,541	81,034	22,856	8,353	152,784
1999	27,594	43,559	15,348	7,571	94,072
1998	28,941	44,322	10,214	7,014	90,491
1997	21,558	27,729	8,793	5,776	63,856
1996	33,100	58,814	18,037	8,616	118,567
1995	25,751	29,727	10,075	8,134	73,687
1994	40,614	58,482	16,995	10,981	127,072
10-year totals	334,750	575,690	153,716	78,937	1,143,093
Averages	33,475	57,569	15,372	7,894	114,309

Departure Accident Rate

Year	Total Number of Accidents	Total Departure Rate	Fixed-Wing Departure Rate	Helicopter Departure Rate	Airtanker Departure Rate	USFS Owned Departure Rate
2003	3	2.29	2.52	2.69	0	0
2002	13	8.15	2.34	9.15	9.73	22.39
2001	4	3.02	5.8	2.83	0	0
2000	4	2.61	2.46	2.46	0	11.97
1999	1	1.06	0	2.29	0	0
1998	3	3.31	3.45	2.25	9.79	0
1997	4	6.26	0	14.42	0	0
1996	5	4.21	0	6.8	0	11.6
1995	2	2.71	0	0	9.92	12.29
1994	10	7.86	2.46	11.96	5.88	9.1
10-Year Average	4.9	4.28	2.09	5.38	3.25	7.6

Departure Accident Rate is the number of accidents divided by the number of departures times 100,000.

Departure Accident Rate
by Aircraft Type

Legend: ☐ Fixed-Wing ☐ Helicopter ☐ Airtanker ☐ USFS Owned ☐ Total
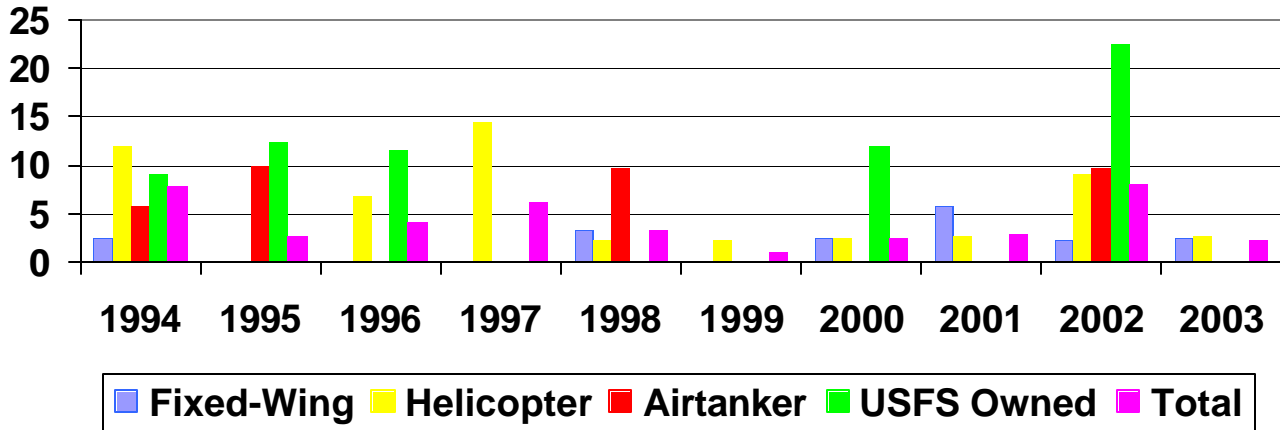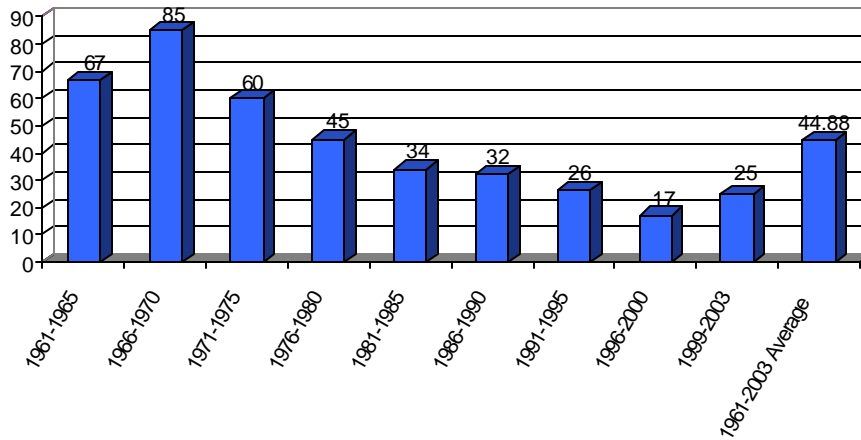
Forest Service Aircraft
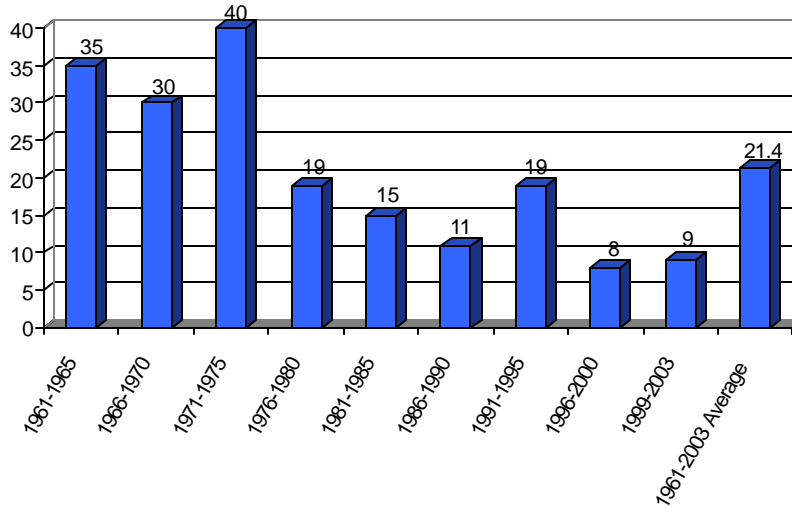# Accident Statistics in 5-Year Increments

Observations

The total number of accidents in 5-year increments shows a steady decline, until the last period. The total number of fatalities in 5-year increments shows a major decline in the 80's from the 70's.

**Total Number of Accidents for all aircraft
(5-Year Increments for 40-Years)**

Period	Accidents
1961-1965	67
1966-1970	85
1971-1975	60
1976-1980	45
1981-1985	34
1986-1990	32
1991-1995	26
1996-2000	17
1999-2003	25
1961-2003 Average	44.88

**Total Number of Fatalities for all aircraft
(5-Year Increments for 40-Years)**

Period	Fatalities
1961-1965	35
1966-1970	30
1971-1975	40
1976-1980	19
1981-1985	15
1986-1990	11
1991-1995	19
1996-2000	8
1999-2003	9
1961-2003 Average	21.4

USFS Owned Aircraft

Forest Service owned aircraft accounted for eight percent of the total hours flown in FY 2003; the fifteen-year average is thirteen percent. Accident rates have steadily declined until FY02 when we experienced two accidents. There have not been any fatalities for the past eight years
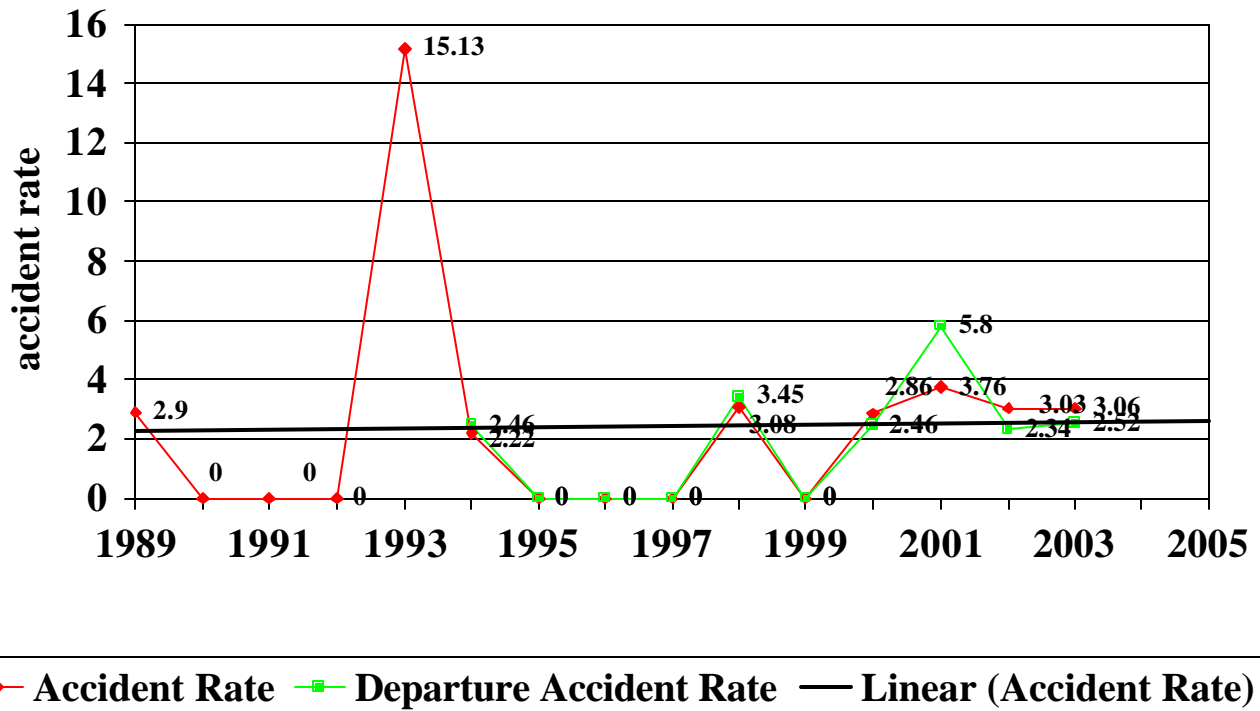

USFS Owned 15-Year Statistics

Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2003	7,607	0	0.00	0	0.00	0	0.00
2002	13,052	2	15.32	0	0.00	0	0.00
2001	11,241	0	0.00	0	0.00	0	0.00
2000	12,749	1	7.84	0	0.00	0	0.00
1999	10,019	0	0.00	0	0.00	0	0.00
1998	9,055	0	0.00	0	0.00	0	0.00
1997	7,608	0	0.00	0	0.00	0	0.00
1996	11,648	1	8.59	0	0.00	0	0.00
1995	9,883	1	10.12	1	10.12	1	10.12
1994	14,405	1	6.94	0	0.00	0	0.00
1993	9,037	0	0.00	0	0.00	0	0.00
1992	9,847	0	0.00	0	0.00	0	0.00
1991	9,610	2	20.81	1	10.41	1	10.41
1990	10,396	0	0.00	0	0.00	0	0.00
1989	9,829	1	10.17	0	0.00	0	0.00
Total	155,986	9		2		2	
Average	10,399	0.6	5.76	0	1.28	0	1.28

USFS Owned Hours Flown and Number of Departures
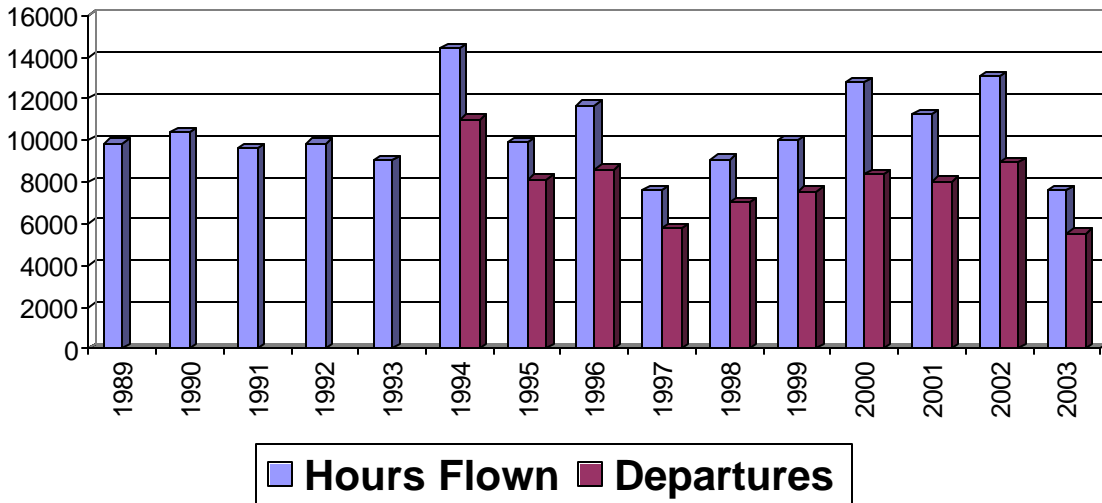
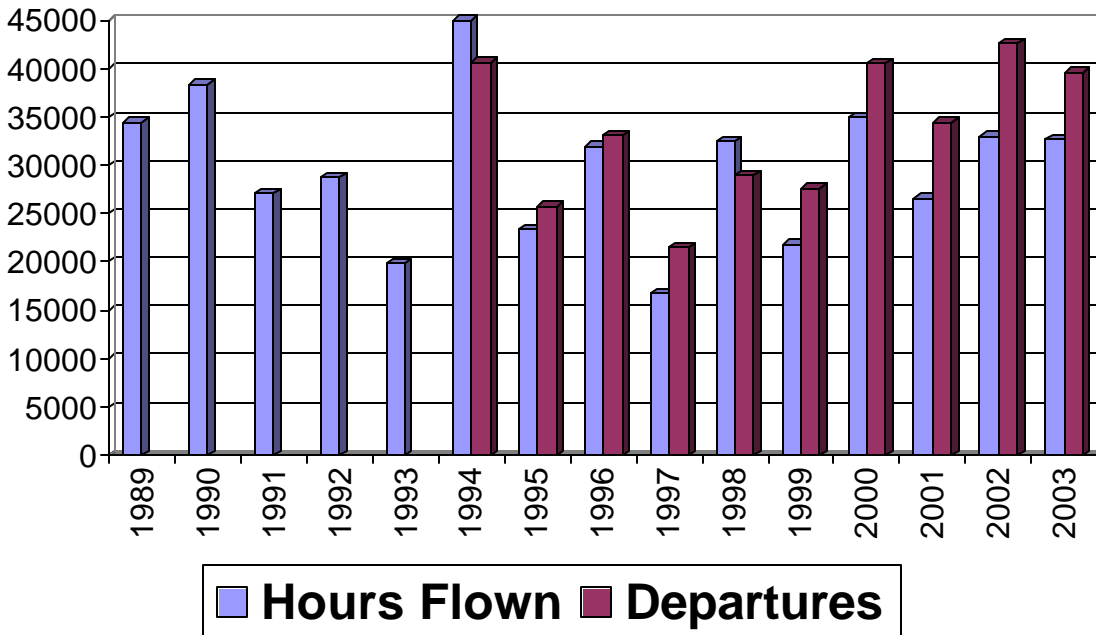## USFS Owned Aircraft Accident Rates 1989 to 2003

15

Fixed-Wing (Contract)

Fixed-Wing aircraft accounted for 34 percent of the total hours flown in FY 2003; the fifteen-year average is 38 percent. There were 32,704 hours flown in FY 2003, which is above the fifteen-year average of 29,876.
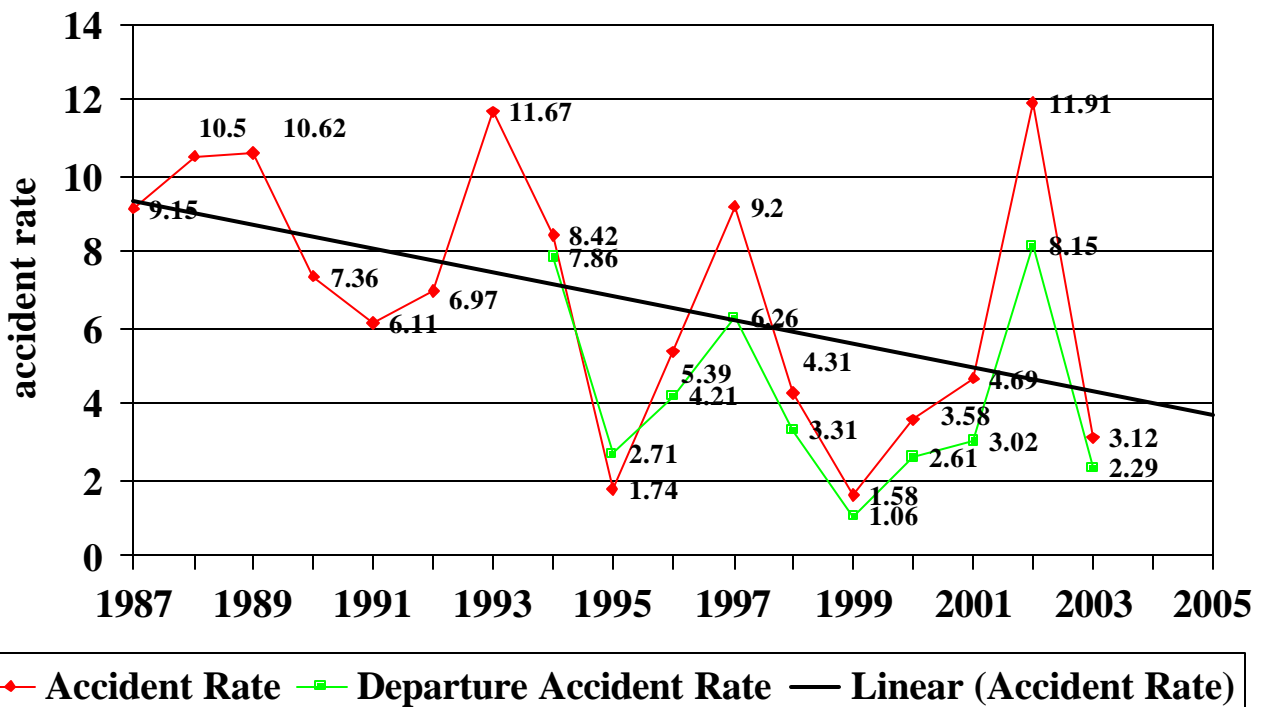

Fixed-Wing 15-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2003	32,704	1	3.06	0	0.00	0	0.00
2002	33,011	1	3.03	0	0.00	0	0.00
2001	26,580	1	3.76	0	0.00	0	0.00
2000	34,976	1	2.86	1	2.86	2	5.72
1999	21,873	0	0.00	0	0.00	0	0.00
1998	32,416	1	3.08	0	0.00	0	0.00
1997	16,753	0	0.00	0	0.00	0	0.00
1996	31,919	0	0.00	0	0.00	0	0.00
1995	23,406	0	0.00	0	0.00	0	0.00
1994	44,995	1	2.22	0	0.00	0	0.00
1993	19,824	3	15.13	1	5.04	4	20.18
1992	28,793	0	0.00	0	0.00	0	0.00
1991	27,056	0	0.00	0	0.00	0	0.00
1990	39,389	0	0.00	0	0.00	0	0.00
1989	34,450	1	2.90	0	0.00	0	0.00
Total	448,145	10		2		6	
Average	29,876	0.66	2.23	0.13	0.44	0.40	1.33

Fixed-Wing Hours Flown and Number of Departures

Legend: ■ Hours Flown ■ Departures

Fixed-Wing (Contract) Aircraft Accident Rates 1989 to 2003

Legend: ◆ Accident Rate ■ Departure Accident Rate — Linear (Accident Rate)
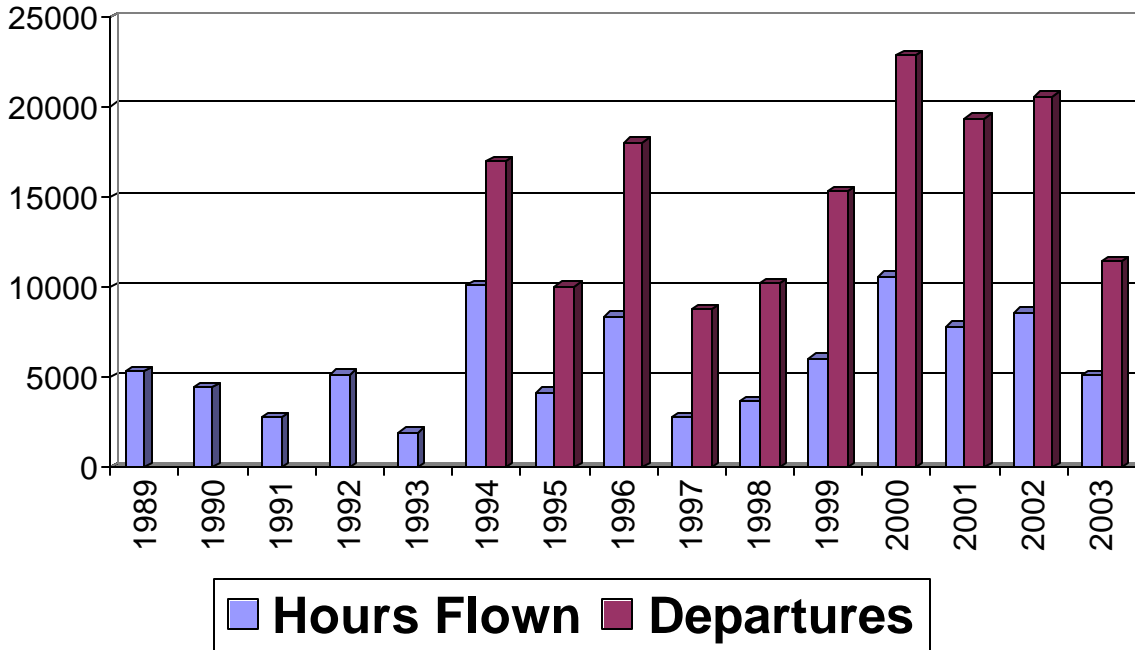
Airtankers

Airtankers accounted for five percent of the total hours flown in FY 2003; which is well below the fifteen-year average. Although they fly the least number of hours, they have the highest accident rate of any aircraft utilized by the USFS.
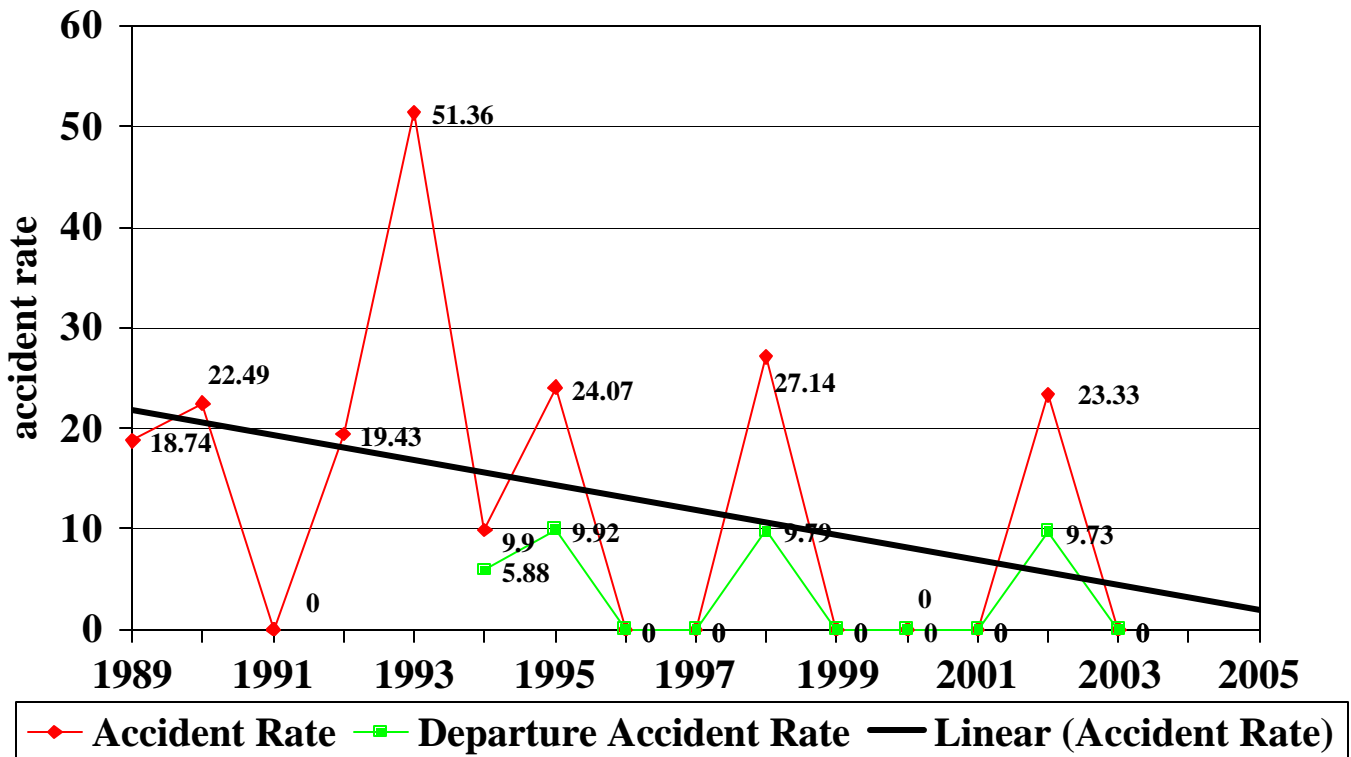

Airtanker 15-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2003	5,082	0	0.00	0	0.00	0	0.00
2002	8,573	2	23.33	2	23.33	5	58.32
2001	7,832	0	0.00	0	0.00	0	0.00
2000	10,616	0	0.00	0	0.00	0	0.00
1999	6,069	0	0.00	0	0.00	0	0.00
1998	3,685	1	27.14	1	27.14	2	54.27
1997	2,801	0	0.00	0	0.00	0	0.00
1996	8,407	0	0.00	0	0.00	0	0.00
1995	4,154	1	24.07	1	24.07	2	48.15
1994	10,100	1	9.90	1	9.90	2	19.80
1993	1,947	1	51.36	1	51.36	2	102.72
1992	5,147	1	19.43	1	19.43	2	38.86
1991	2,782	0	0.00	0	0.00	0	0.00
1990	4,446	1	22.49	1	22.49	2	44.98
1989	5,337	1	18.74	0	0.00	0	0.00
Total	86,978	9		8		17	
Average	5,799	0.6	10.34	0.53	9.19	1.13	19.54

Airtankers Hours Flown and Number of Departures

Hours Flown   Departures

Airtanker Accident Rates 1989 to 2003

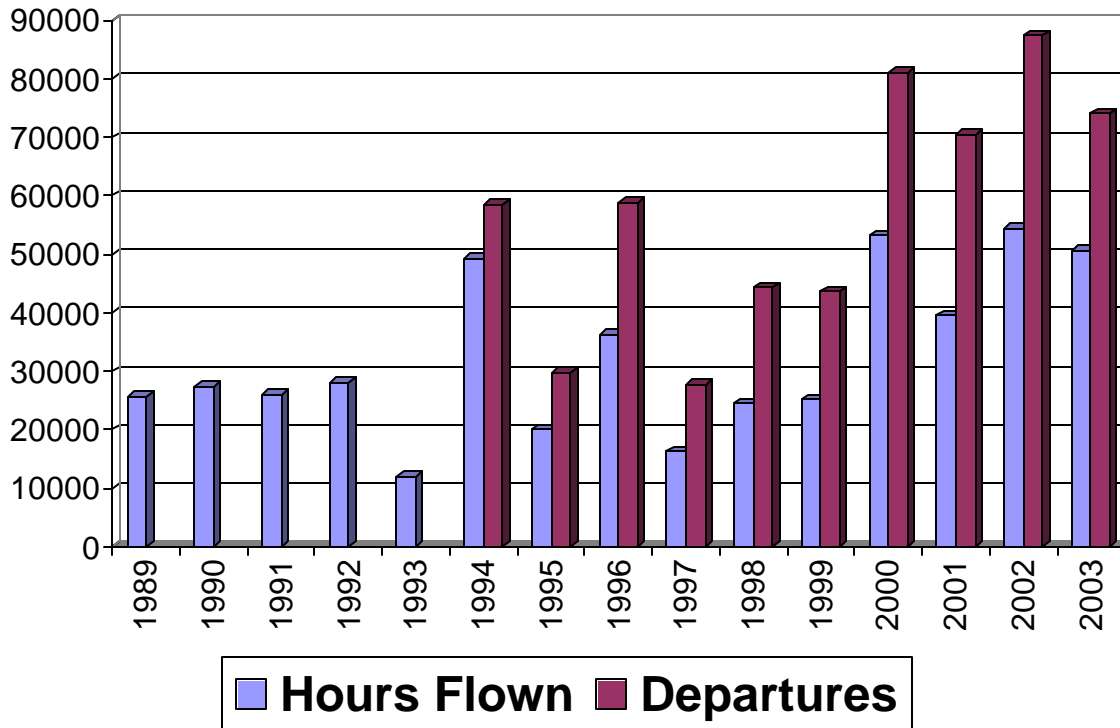Accident Rate   Departure Accident Rate   Linear (Accident Rate)

Helicopters

Helicopters accounted for the largest percent of the total hours flown in FY 2003. They flew 53 percent of the total hours flown in FY 2003. The 15-year average is 42 percent. The average number of accidents is nearly five; we experienced 2 in FY 2003.


Helicopter 15-Year Statistics							
Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rates	Fatalities	Fatality Rate
2003	50,662	2	3.95	1	1.97	2	3.95
2002	54,427	8	14.70	1	1.84	1	1.84
2001	39,497	2	5.06	0	0.00	0	0.00
2000	53,145	2	3.76	0	0.00	0	0.00
1999	25,174	1	3.97	0	0.00	0	0.00
1998	24,423	1	4.09	1	4.09	2	8.19
1997	16,295	4	24.55	1	6.14	2	12.27
1996	36,307	4	11.02	0	0.00	0	0.00
1995	20,031	0	0.00	0	0.00	0	0.00
1994	49,200	7	14.23	3	6.10	4	8.13
1993	12,026	1	8.32	0	0.00	0	0.00
1992	27,973	4	14.30	0	0.00	0	0.00
1991	26,032	2	7.68	1	3.84	1	3.84
1990	27,309	5	18.31	0	0.00	0	0.00
1989	25,749	5	19.42	0	0.00	0	0.00
Total	488,250	48		8		12	
Average	32,550	3.2	9.83	0.53	1.63	1.20	2.45

Helicopters Hours Flown and Number of Departures

Legend: Hours Flown, Departures

Helicopter Accident Rates 1989 to 2003

Legend: Accident Rate, Departure Accident Rate, Linear (Accident Rate)
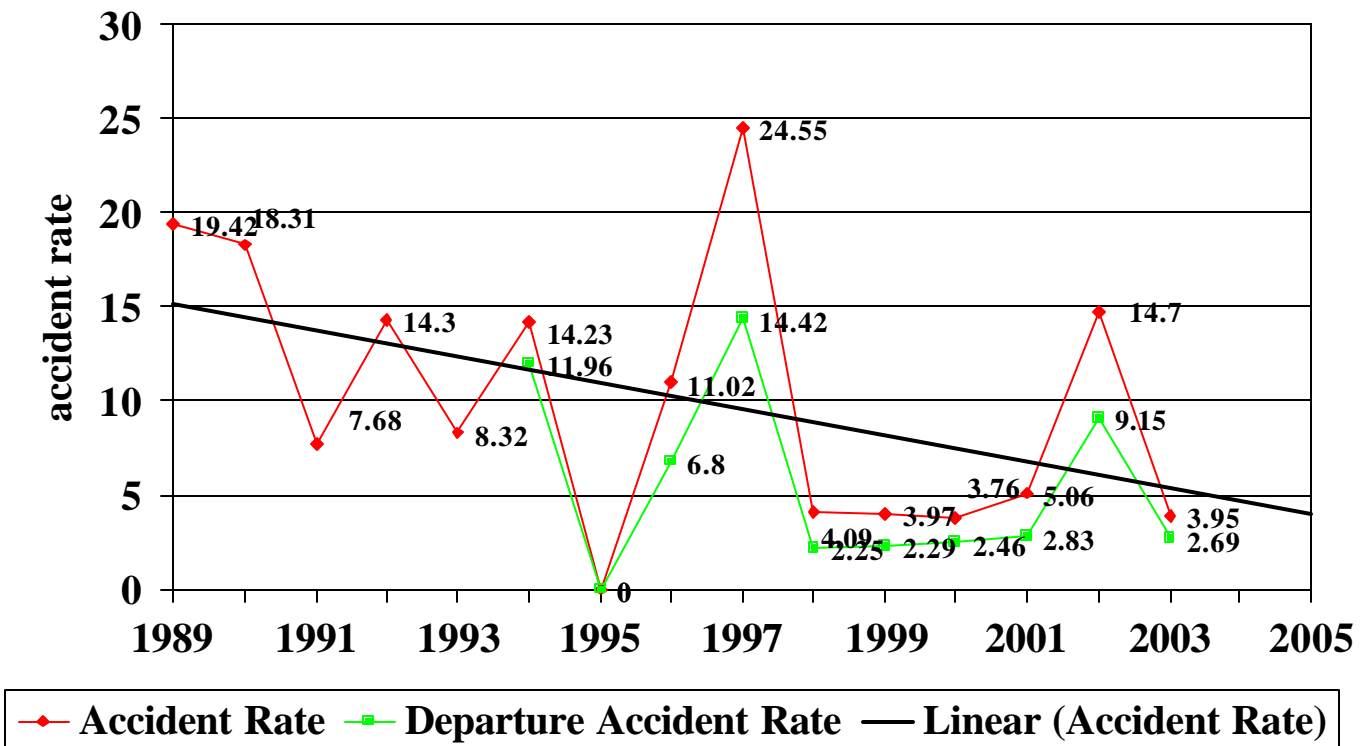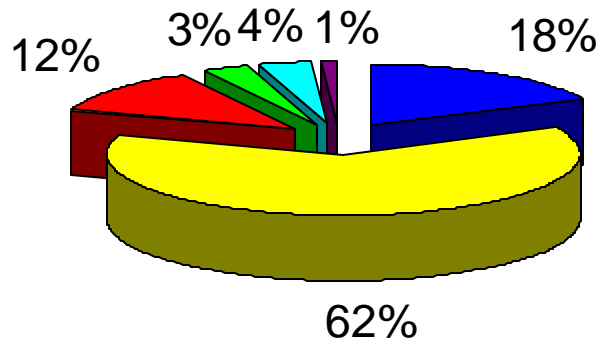
SafeCom Summary

The SafeCom system satisfies Federal Aviation Regulations requirements for incident reporting, but more importantly, it provides management and front line supervisors with near real time trend information. Armed with data on emerging safety and effectiveness challenges, operators and management can take appropriate actions <u>before</u> a mishap occurs. The National Aviation Safety Center provided monthly safety summaries to the field by providing hard copy and internet access to vital risk management data.

These charts trend the SafeCom data posted on the Forest Service Aviation Internet site at http://www.safecom.gov/ The average of total numbers of submitted SafeCom's is 636 per year. The FY 2003 number is significantly higher at 887. The total number of SafeCom's submitted fluctuates with the total number of hours flown.

Again, this year no big surprises, the five most reported SafeCom's were engine, communications, intrusions, electrical and dropped loads. In an analysis of the past five years policy deviation was in the top five most reported, which decreased significantly in FY 2002.

FY 2003 SafeCom Information		
Aircraft Type	Number	Percent of all SafeCom's
Fixed Wing	157	17.7%
Helicopter	552	62.2%
Airtanker	108	12.2%
SEAT	9	1.0%
USFS Owned	29	3.3%
Other	32	3.6%
Total	887	100%
Category	Number	Percent of all SafeCom's
Airspace	81	9.1%
Hazard	223	25.1%
Incident	136	15.3%
Maintenance	447	50.4%
Total	887	100%

FY '03 SafeCom's by Aircraft Type

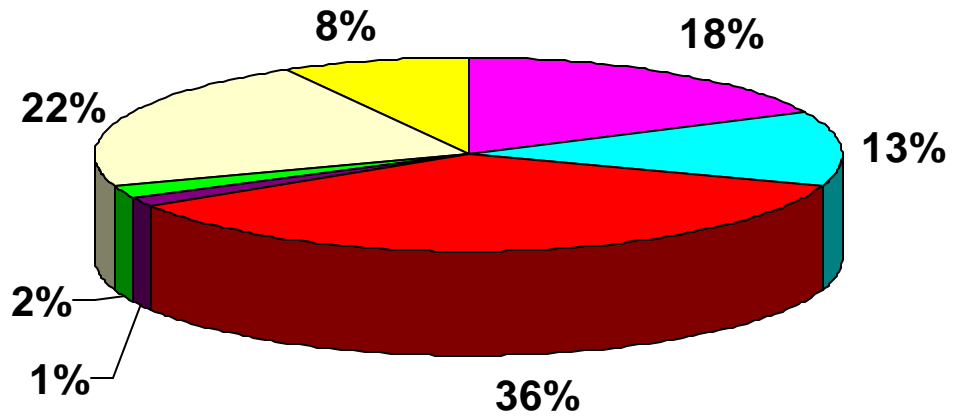|	
■ Fixed-Wing	□ Helicopter
■ Airtanker	■ USFS Owned
□ Other	■ SEAT

FY '03 Safecoms by Category

□ Maintenance   ■ Airspace   □ Hazard   ■ Incident

FY '03 Airspace SafeCom's

- 7%
- 12%
- 1%
- 22%
- 6%
- 52%

Conflict	Intrusion	Near Mid-Air
Other	Procedures	Route Deviation

FY '03 Hazard SafeCom's

Communications · Flight Equipment · Flight Following · Fuel · Ground Equipment · Instructions · Other · Pilot Action · Policy Deviation · Weather
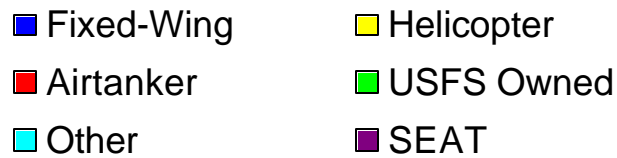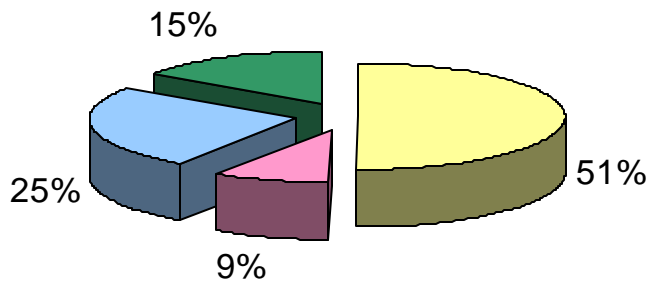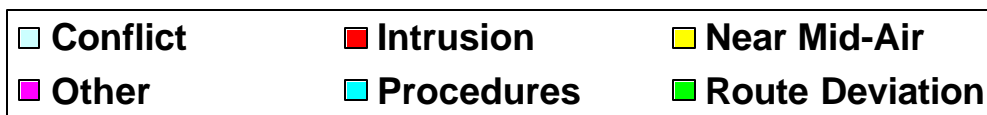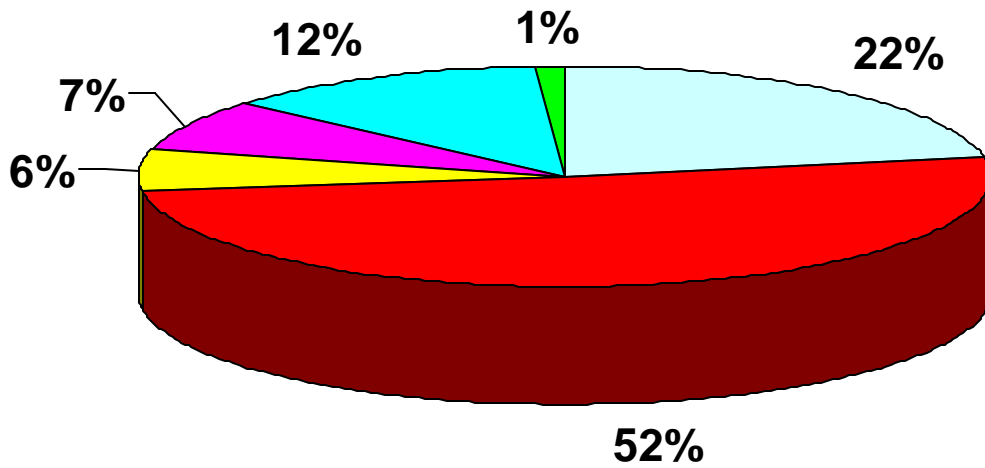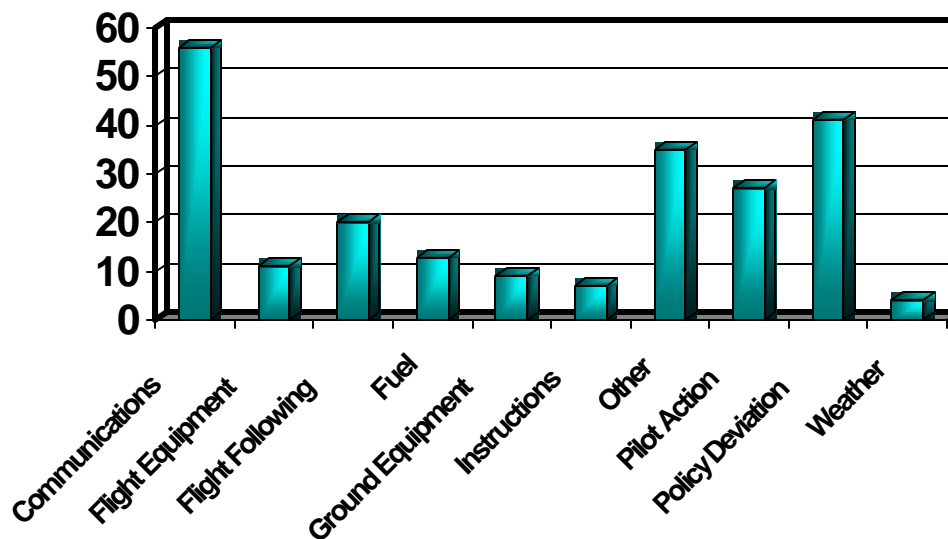
FY '03 Incident SafeCom's

Legend:
- Aircraft Damage
- Dragged Load
- Dropped Load
- Forced Landing
- Ground Damage
- Other

Pie chart values: 8%, 18%, 13%, 36%, 1%, 2%, 22%
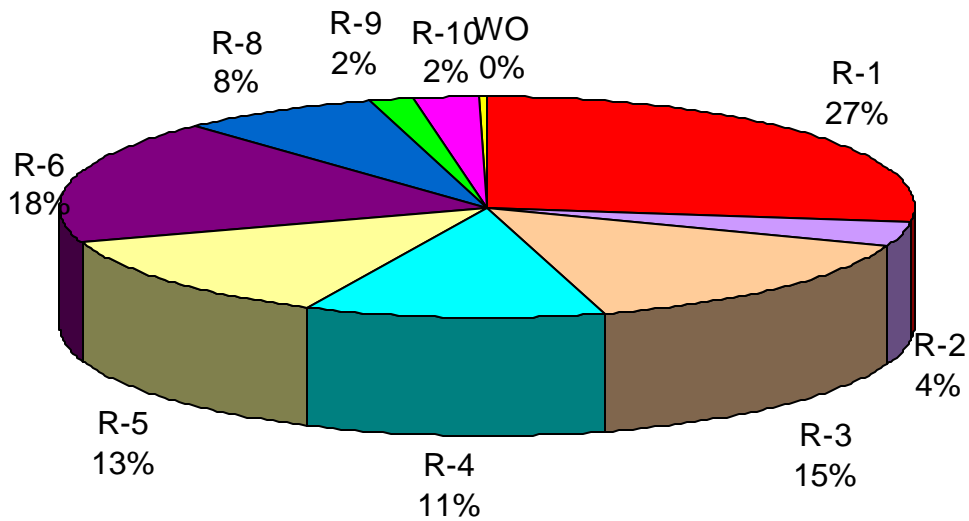
FY '03 Maintenance SafeComs
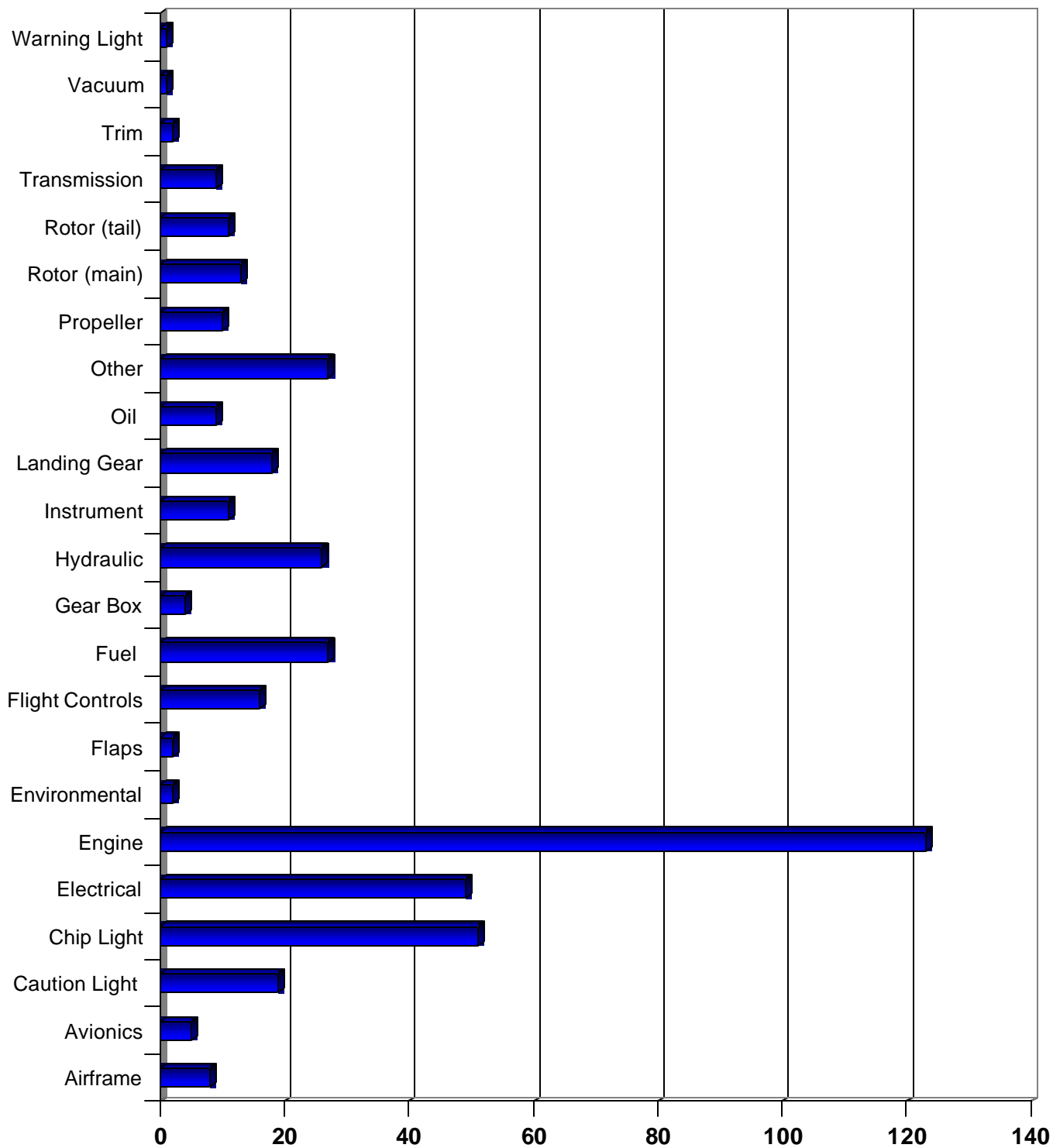
SafeCom's by Region

The chart below shows the number of SafeComs by region (FS and other agency) reported in FY 2003. There were a total of 887 SafeComs reported, 812 were USFS and 75 were other agencies.

USFS ■ **Other Agencies**
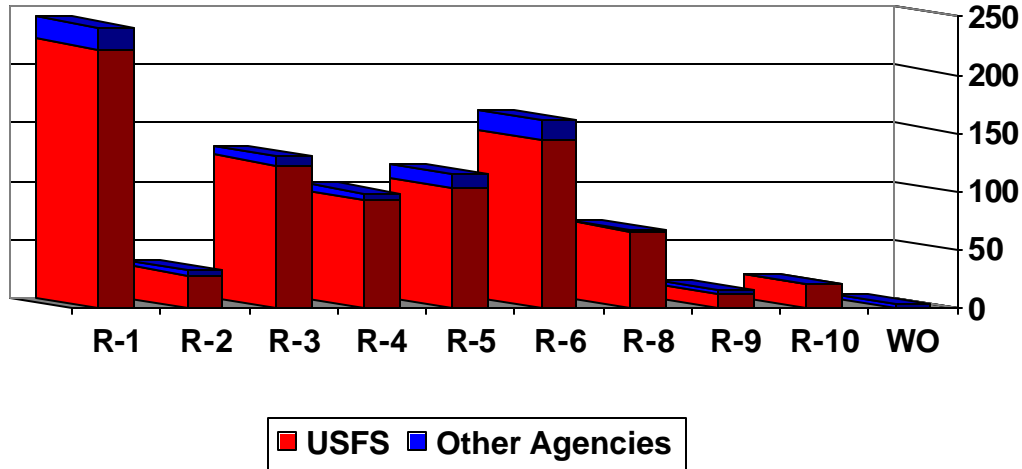
Percent of Safecoms by Region

FY '03 SafeCom's by Category and Region					
Region	Airspace	Hazard	Incident	Maintenance	Total
Region 1	28	42	34	137	241
Region 2	8	12	2	11	33
Region 3	9	42	20	60	131
Region 4	10	29	13	47	99
Region 5	8	23	21	63	115
Region 6	12	41	34	74	161
Region 8	3	19	8	37	67
Region 9	2	6	3	5	16
Region 10	0	7	1	13	21
WO	1	2	0	0	3
Total	81	223	136	447	887

FY '03 SafeCom's by Aircraft Type and Region						
Region	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Owned	N/A	Total
Region 1	41	157	28	0	14	1	241
Region 2	12	12	5	1	1	2	33
Region 3	21	82	12	5	2	10	132
Region 4	15	56	17	2	6	3	99
Region 5	16	81	14	0	0	4	115
Region 6	23	98	29	1	2	7	160
Region 8	7	55	0	0	1	4	67
Region 9	10	5	1	0	0	0	16
Region 10	11	7	0	0	2	1	21
WO	2	0	1	0	0	0	3
Total	158	553	107	9	28	32	887

2003 Accident Review

Human actions are cited as causal factors in the majority of aircraft accidents and incidents.

Over the past 40 years, more than 80% of accidents and incidents may have been preventable through the proper application of Human Factors principles and a change in Aviation Safety Culture.

The Forest Service experienced three accidents in the 2003 fiscal year.   Two of the accidents were mechanical with only one being human error.   There were two fatalities and three serious injuries.

Human error has been implicated in 70-80% of all civil and military accidents. Yet, most accident reporting systems are not designed around any theoretical framework of human error. As a result, most accident databases are not conductive to a traditional human error analysis, making the identification of intervention strategies onerous. What is required is a general human error framework around which new investigative methods can be designed and existing accident databases restructured. Indeed, a comprehensive human factors analysis and classification system (HFACS) has recently been developed to meet those needs. Specifically, the HFACS framework has been used within the military, commercial, and general aviation sectors to systematically examine underlying human casual factors and to improve aviation accident investigations. Although the Forest Service does not have the HFACS in a database yet, we have required our accident investigators over the last few years to complete an HFACS checklist, which we intend to get put into a database in the near future.

NTSB 831.13 Flow and dissemination of accident or incident information.
(b)…Parties to the investigation may relay to their respective organizations information necessary for purposes of prevention or remedial action.
…However, no (release of) information… without prior consultation and approval of the NTSB.

Avoid discussion of "Probable Cause", unless determined and published by the NTSB For accident prevention purposes only.

In Memory Of

Jules Mier

Charles Krenek

Angelina NF, Texas

NTSB Identification: **FTW03FA118**
14 CFR Part 91: General Aviation
Accident occurred Thursday, March 27, 2003 in Broadus, TX
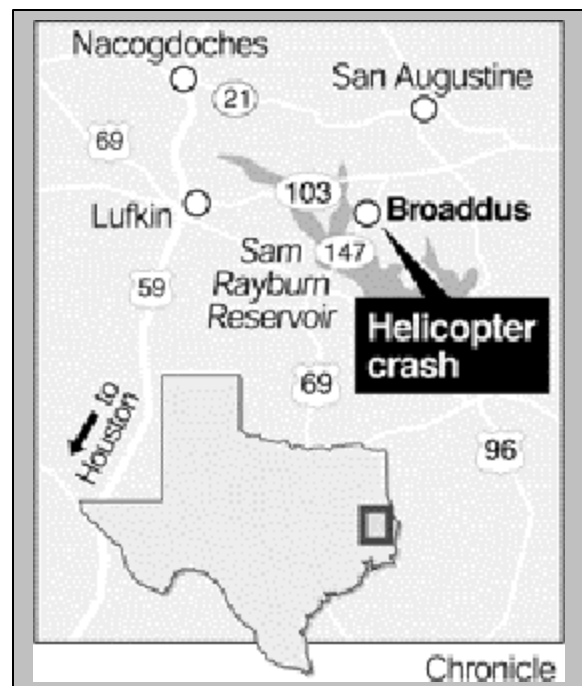Aircraft: Bell 407, registration: N175PA
Injuries: 2 Fatal, 3 Serious.

Mission

Aerial search and recovery of debris from the Space Shuttle Columbia accident, the aircraft was under a CWN contract with the USDA, Region 3.

The pilot and 1 crewmember were fatally injured and 3 crewmembers sustained serious injuries.

Visual meteorological conditions prevailed. The helicopter was completing its second search mission of the day while hovering about 125 feet above the ground. The surviving passengers reported that the helicopter lost power and descended rapidly into the 80-foot tall trees. The helicopter came to rest on its right side at the base of a 80-foot tree.

After the wreckage was recovered, the engine was removed and set up in a test cell. The engine operated normally in the manual mode. During the test cell run, it was discovered that the power lever angle (PLA) indicator on the Hydro Mechanical Unit (HMU) responded erratically to normal throttle inputs when the engine was operated in the electromechanical mode.
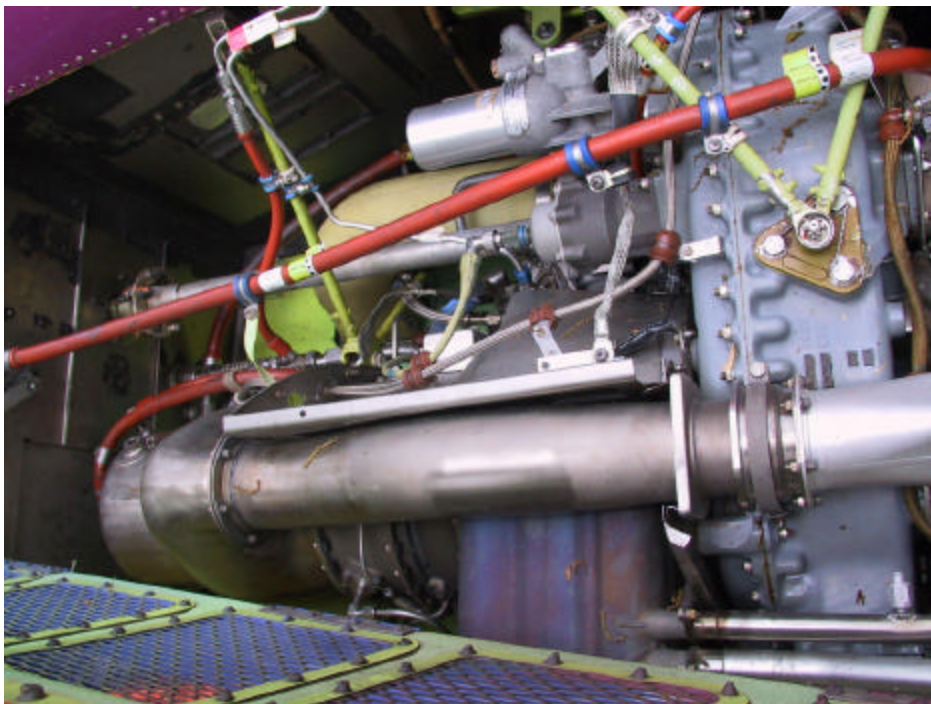
Gypsy Moth Project, Narrows, VA.

NTSB Identification: **NYC03TA138**
14 CFR Part 91: General Aviation
Accident occurred Thursday, June 26, 2003 in Pearisburg, VA
Aircraft: Air Tractor 402A, registration: N4506L
Injuries: 1 Uninjured.

Mission

Aerial application of Pheromone flakes in support of the Gypsy Moth slow the spread strategy (STS)

The pilot was in the middle of a run when he observed orange flames and black smoke emitting from the engine exhausts. He feathered the propeller, and set up for a forced landing in a nearby open area.
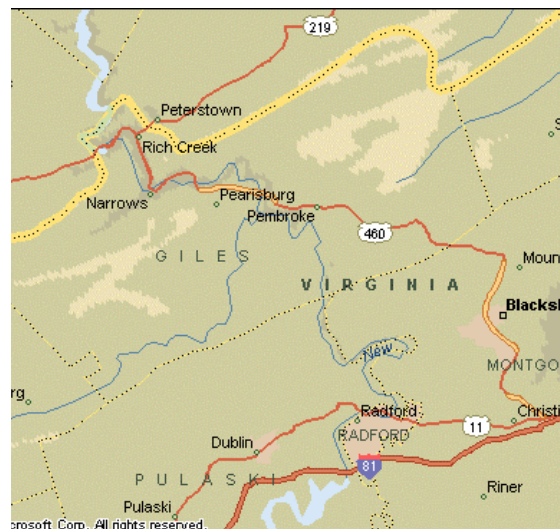
The Air Tractor under contract to the USDA Forest Service, was substantially damaged during the forced landing

The engine was reported to have a total time of 26,775 hours, including 10,708.9 hours since last overhaul and was retained for further examination.

The tear down analysis revealed excessive damage to the compressor blades and other turbine components
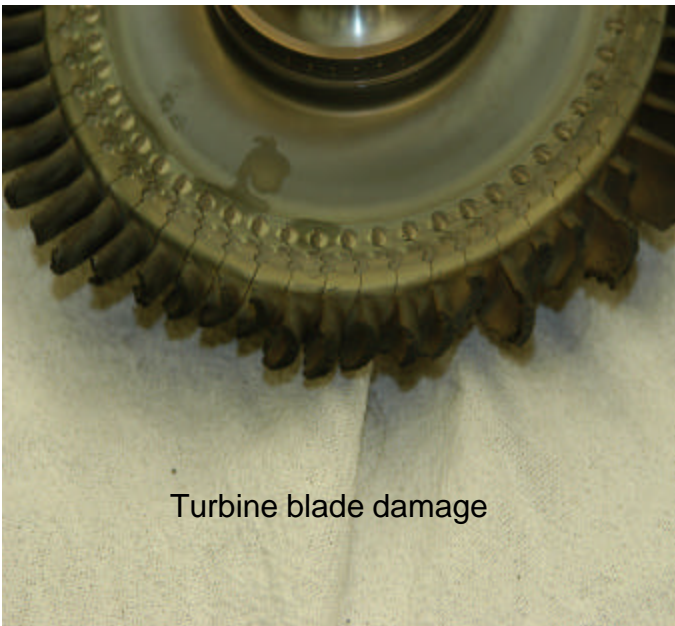
Turbine blade damage

Hole in Burn Can

34

Tucson, AZ, Coronado NF

NTSB Identification: **LAX03TA229**
14 CFR Part 133: Rotorcraft Ext. Load
Accident occurred Monday, July 07, 2003 in Tucson, AZ
Aircraft: Sikorsky S-64E, registration: N6979R
Injuries: 2 Uninjured.

Mission
The purpose of the flight was to provide retardant/water drops for suppression of the Aspen fire.

The helicopter was equipped with a 2,000 gallon fixed tank with snorkel hover fill capability, and configured to carry a maximum of three flight crewmembers.

Maintenance personnel discovered the exhaust tube on the left engine was damaged. The helicopter was shutdown and examined

Upon closer inspection, it was determined that "all pieces were there." Other components of the helicopter were also examined. All 4 tail rotor blades sustained damage.
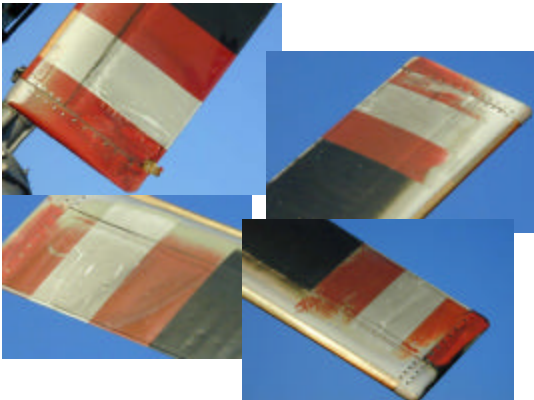
There was a misjudgment of aircraft clearance to trees, and loss of pilot situational awareness. Both dip site personnel and the pilots failed to assess unseen hazard of trees at dip site.

Suspected Tree Strikes

Incidents With Potential

The Forest Service experienced 9 Incidents With Potential (IWP) in FY 2003 which included:
- 1 Rotor Strike (Bell 212) NASA
- 2 Wire Strikes (Bell 206L4) WY-BTF and Bell (206L3) NASA
- 1 Unintended Take Off (AS350B2) WA-WEF
- 1 Wing Damage, landing/go around (Dromander M18A) AZ-TNF
- 1 Near Mid-Air Collision (DC7 & BE58P)
- 3 Fuel Starvations (Piper Seneca III) MT-FNF, (Cessna 337) ID-BOF & (Cessna 185) R-10

The following focus on the three fuel starvation IWP's.

Flathead NF, Wedge Canyon

The Piper Seneca III flying an Air Attack Mission over the Wedge Canyon Fire began to lose power on one engine During the trouble-shooting of the rough-running engine, the pilot realized his fuel gauges were showing empty.
The pilot was able to make a successful forced landing into a back-country airstrip without damage to the aircraft.

The pilot had asked the local FBO to "top off the tanks", the pilot was told by an employee of the FBO that the aircraft had been fueled. The pilot believed the tanks were full but did not visually check the fuel in the tanks or monitor fuel gauges.

Boise NF, Canyon Creek

The mission of this Cessna 337F was to fly Air Attack in support of the Canyon Creek incident in the Boise National Forest.

After about 3 hours of flying time the aircraft departed the Canyon Creek Fire inbound to Boise Airport. Approximately 20 miles from the Boise Airport the aircraft had a front engine failure. A safe landing was made at Boise.

The pilot indicated that the aircraft was refueled at the end of the previous mission day and that he visually checked the fuel quantity immediately after fueling was complete. The pilot said he checked the fuel gauges before the flight, but upon inspection after the incident, the gauges were found to be inaccurate.

Tongass NF, Yakutat, AK

The Cessna 185 departed the Yakutat airport with three passengers to conduct moose telemetry survey.

This pilot serviced the aircraft with all the required fuel in one tank.

The fuel selector switch was placed to the left tank during the start up and remained there for just over two hours until in a tight turn at 1,000 AGL the aircraft experienced fuel starvation and an in flight engine shut down (power loss).

(Not Incident Aircraft)

As the aircraft started to loose altitude, the pilot set up for an emergency landing on a gravel bar and proceeded with a restart. The pilot regained powered flight by switching tanks and initiating an in flight restart at less than 300 AGL. The pilot terminated the mission and returned to base