United States Department of Agriculture

Forest Service

FY 2004

Aviation Safety Summary

Prepared by the
National Aviation Safety Center
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 the FY 2004 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 to 900 aircraft. These include government owned, chartered, leased, and contractor operated aircraft. The Forest Service owns approximately 250 aircraft and operates 38 aircraft (36 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 600 helicopters and fixed wing aircraft of various makes and models were chartered, leased or contracted in FY 2004. The aircraft are inspected and “carded” for government use by interagency inspectors, and are flown and maintained by the contractors.

Aviation Safety Accomplishments

We continue to look for ways to improve aviation safety. The USFS Aviation Safety Council unanimously agreed to adopt the System Safety and begin implementation in 2005. Accomplishments achieved in aviation safety in FY 2004 included:

Safety Initiatives:

- Airspace Steering Committee
- MOA – Pilot Training for low level /mountain flying; APHIS
- Safety Alerts (8)
- Technical Alert (1)
- Airwards (3 issues)
- Contracted for Hot, High, Heavy accident history and trend analysis
- Airtanker Modernization Standards participation
- Coordinated Dropped Loads accident history and trend analysis
- M-18 Dromader SEAT Safety Stand-down
- SEAT field review team
- SAFECOM database combined with DOI
- Office efficiency improvement project; conference area/resource library/work center
- Added a new metric (Sorties per 100K hours) to annual report
- Coordinated investigation teams on 5 accidents
- RASM lead assignments in areas of expertise
- Support and mentor Automated Flight Following project

Policy/Procedure Recommendations

- Draft 5720 manual final
- 5709.16 Requirement for risk assessment
- 5709.16 Requirement for pilot training standards
- Contract requirement for FAR Part 27 helicopters (Type 3)
- Changes to FS SEAT contracts to improve performance planning

Training Programs:

- Transferred funding to R-5 Training Center
- Coordinated/funded project with DOI for Interagency Aviation Training program
    - On-line computer based training/ contracted course development
    - ACE classroom training held at 2 locations
- Coordinated/Funded project with BLM for SEAT pilot training
- Contracted for professional curriculum development
- Coordinated USFS ACE instructor assignments, preparation
- Presented FS Aviation Safety Review at four training courses

Statistical Summary

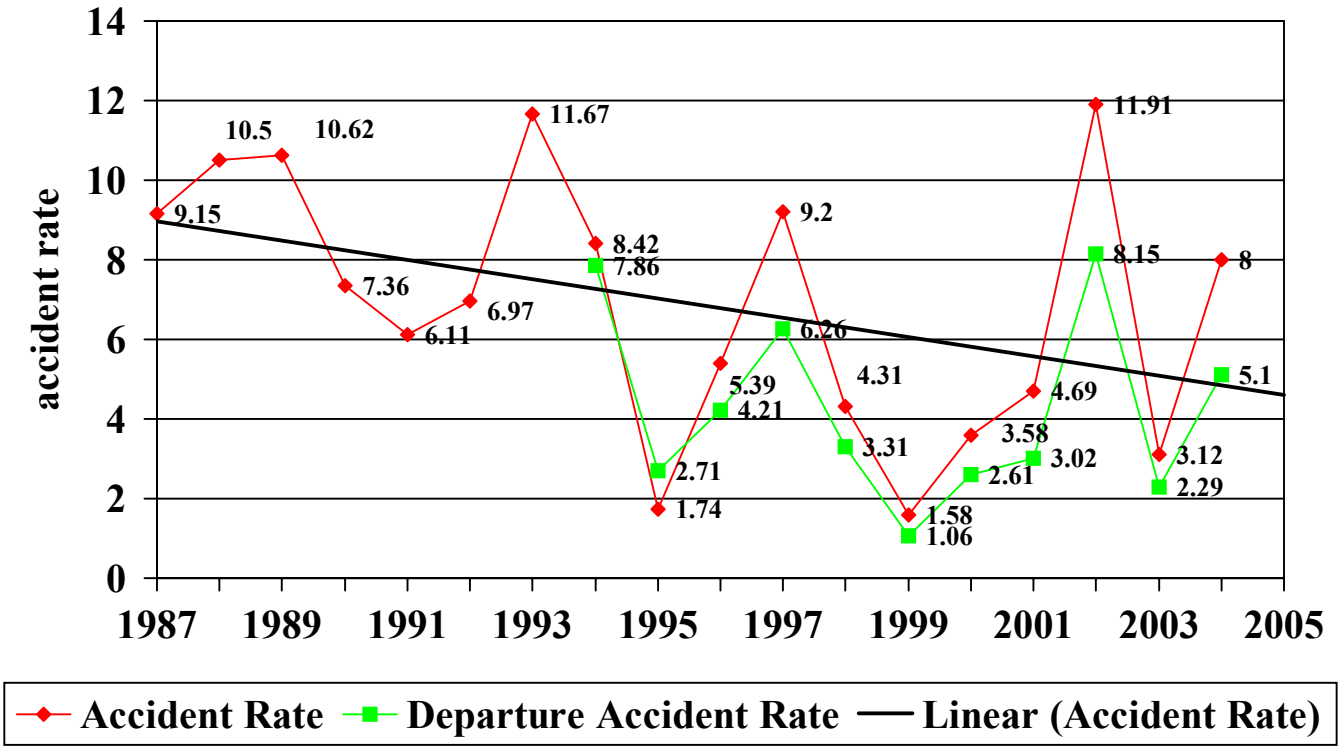
The accident rate for fiscal year 2004 is 8.0 which is above the 15 year average of 6.29. We experienced 5 accidents and 9 “Incidents with Potential” (IWP). Unfortunately, we did not make it through the year without any fatalities. There were four fatalities, one helicopter and three fixed-wing. The USFS flew 62,472 hours, which is 15,292 hours less than 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
- ✓ Infrared mapping
- ✓ 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.

USFS Aircraft Accident Rates 1987 to 2004



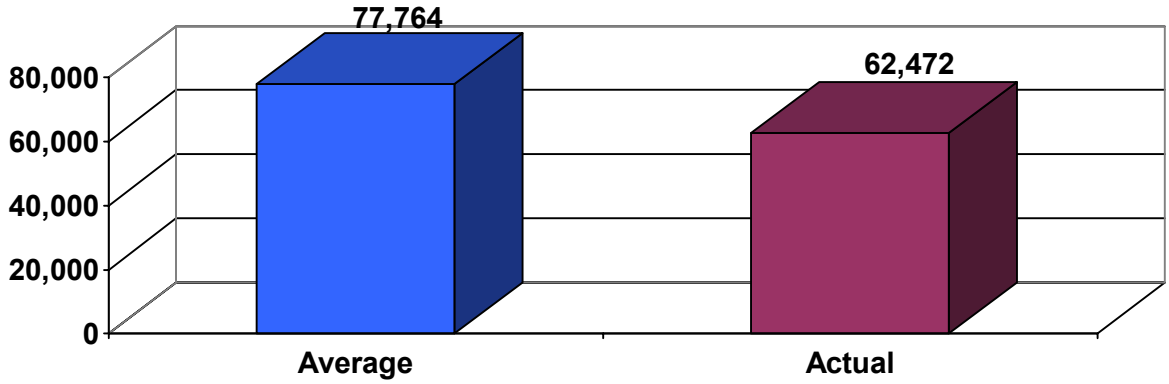
FY 2004 Accident Statistics

Aircraft Type	Hours	Number of Accidents	Accident Rate	Number of Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
Fixed-Wing	22,713	2	8.8	1	4.4	3	13.2
Helicopter	29,885	2	6.69	1	3.34	1	3.34
Airtanker	1,535	0	0	0	0	0	0
* SEAT	1,006	1	99.4	0	0	0	0
USFS Owned	7,333	0	0	0	0	0	0
Total	62,472	5	8.0	2	3.2	4	6.4

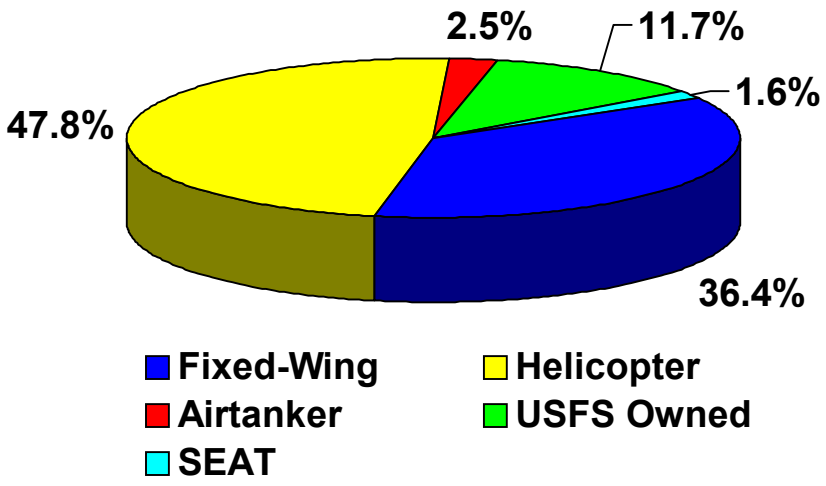
The actual hours flown in FY 2004 are below the fifteen-year average of 77,764. Analysis of the data shows a decrease (-15,292) in total number of hours flown.

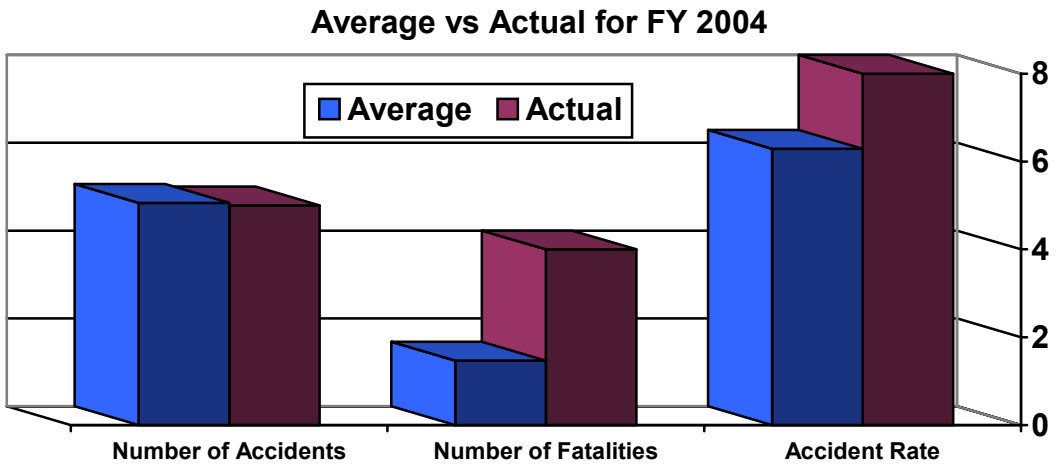
*SEAT – flight hours for SEAT aircraft on USFS lands were obtained from the DOI, Aviation Management Directorate. This is the first year this information has been obtained. The reason the SEAT accident rate is so high is due to the low number of flight hours.

Average vs Actual Hours Flown for FY 2004



FY04 Flight Hour Percentages





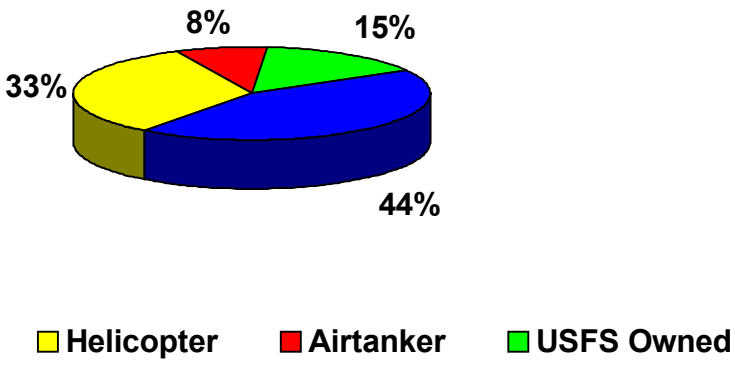
Comparison of Averages FY 1990-2004			
	15 Year Average	Actual	Comparison
Hours flown	77,764	62,472	-15,292
Number of Accidents	4.87	5	+.13
Number of Fatalities	1.47	4	+2.53
Accident Rate	6.29	8.13	+1.84

15-Year Flight Hour Statistics

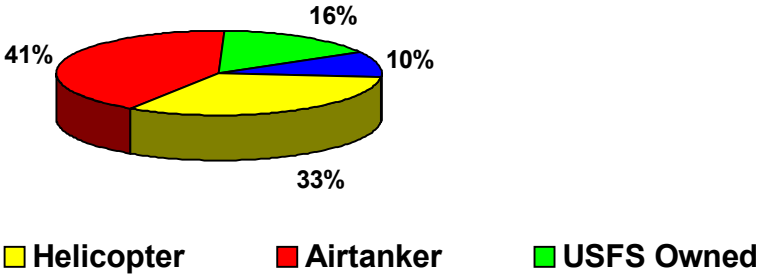
Flight Hours:						
Fiscal Year	**Fixed Wing**	**Helicopter**	**Airtanker**	**SEAT**	**USFS Owned**	**Total**
2004	22,713	29,885	1,535	1,006	7,333	62,472
2003	32,704	50,662	5,082		7,607	96,055
2002	33,011	54,427	8,573		13,052	109,063
2001	26,580	39,497	7,832		11,241	85,150
2000	34,976	53,145	10,616		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
15-year totals	436,408	492,386	83,176		153,490	1,166,466
Averages	29,094	32,826	5,545		10,233	77,764

Accident Rates by Flight Hours Vs. Departure

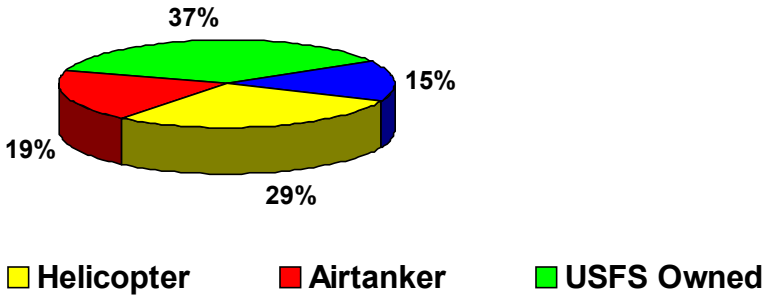
15 Year Average of Flight Hour Percentages 1990-2004



15 Year Average Accident Rate Percentages 1990-2004



10 Year Average Departure Accident Rate Percentages 1995-2004



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
2004	5	8.0	8.8	6.69	0.00	0.00
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
15-year Average	4.87	6.29	2.79	9.39	11.85	4.64

Total Fatal Accident and Fatality Rates

Year	Fatal Accidents	Fatal Accident Rate	Number of Fatalities	Fatality Rate
2004	2	3.2	4	6.4
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
15-year Average	1.47	2.13	2.67	3.78

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

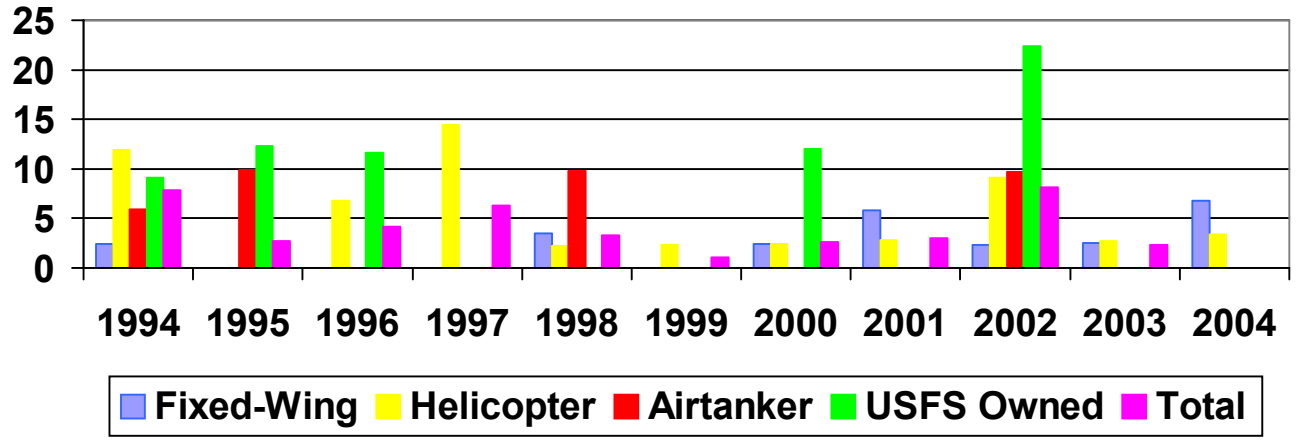
Number of Departures:					
Fiscal Year	**Fixed Wing**	**Helicopter**	**Airtanker**	**USFS Owned**	**Total**
2004	29,391	58,851	4,399	5,258	97,899
2003	39,643	74,133	11,463	5,545	130,784
2002	42,581	87,387	20,553	8,932	159,453
2001	34,427	70,503	19,382	8,015	132,327
2000	40,541	81,034	22,856	8,353	152,784
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	323,527	576,059	141,120	73,214	1,113,920
Averages	32,353	57,606	14,112	7,321	111,392

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
2004	5	5.1	6.8	3.4	0	0
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
10-Year Average	4.4	3.87	2.34	4.62	2.94	5.82

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

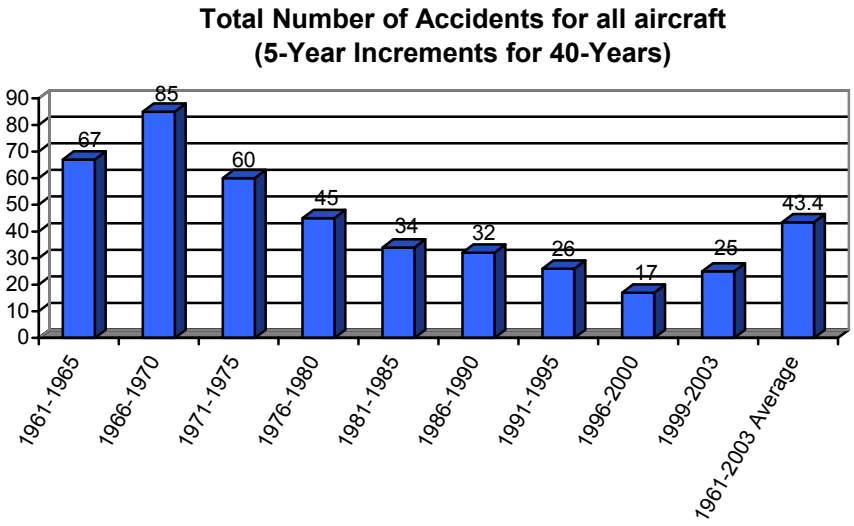
Departure Accident Rate by Aircraft Type

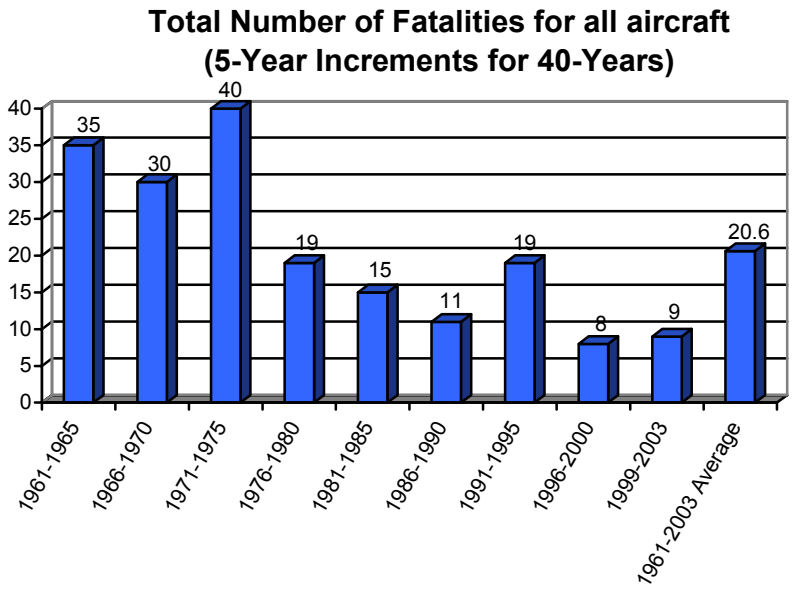


Forest Service Aircraft
Accident Statistics in 5-Year Increments

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.



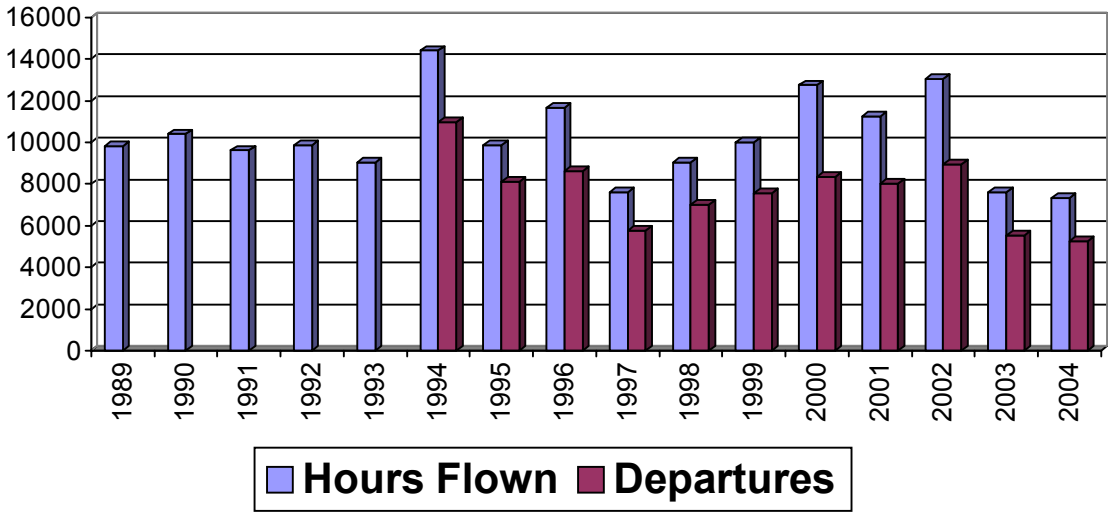


USFS Owned Aircraft

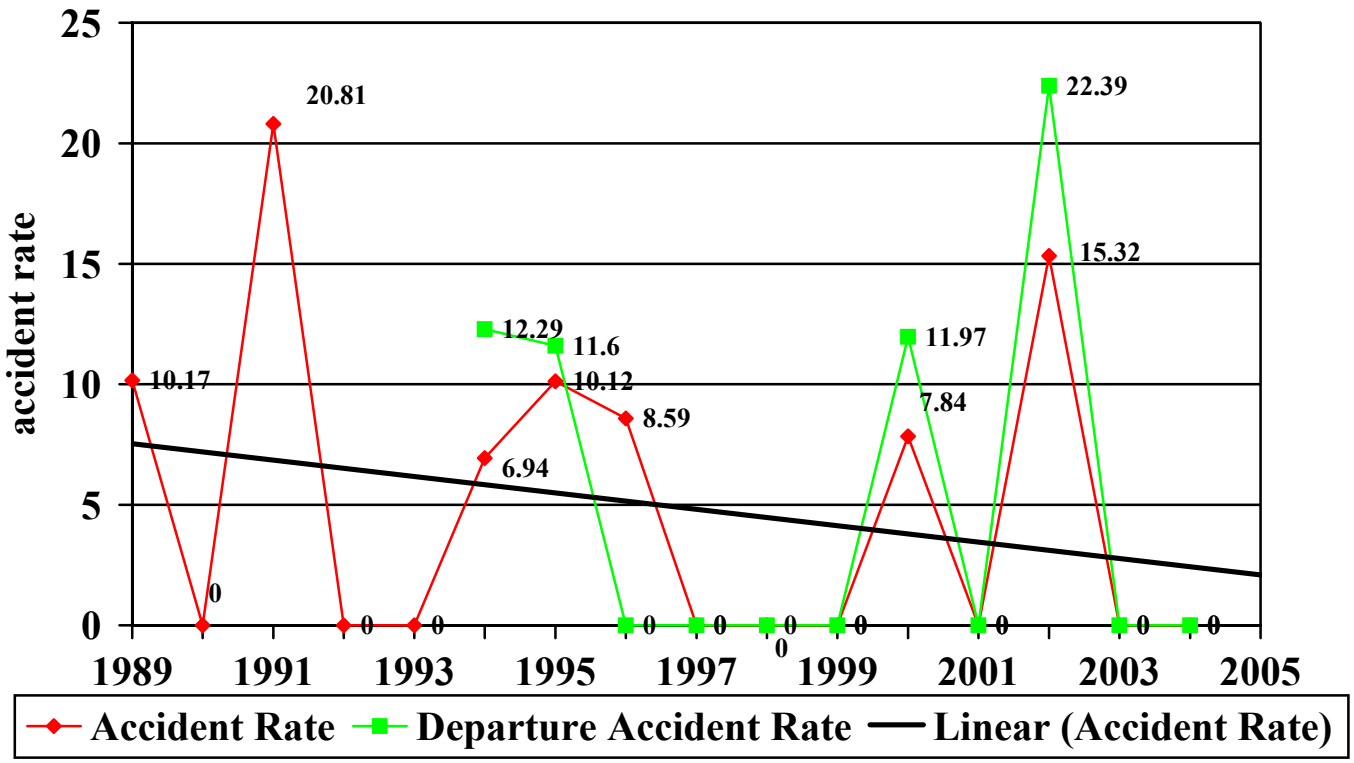
Forest Service owned aircraft accounted for nearly 12 percent of the total hours flown in FY 2004; the fifteen-year average is 15 percent. Accident rates have steadily declined until FY02 when we experienced two accidents. There have not been any fatalities for the past nine years

USFS Owned 15-Year Statistics							
Fiscal Year	**Hours Flown**	**Accidents**	**Accident Rate**	**Fatal Accidents**	**Fatal Accident Rate**	**Fatalities**	**Fatality Rate**
2004	7,333	0	0.00	0	0.00	0	0.00
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
Total	153,490	8		2		2	
Average	10,233	.53	4.46	0.13	1.37	0.13	1.37

USFS Owned Hours Flown and Number of Departures



USFS Owned Aircraft Accident Rates 1989 to 2004



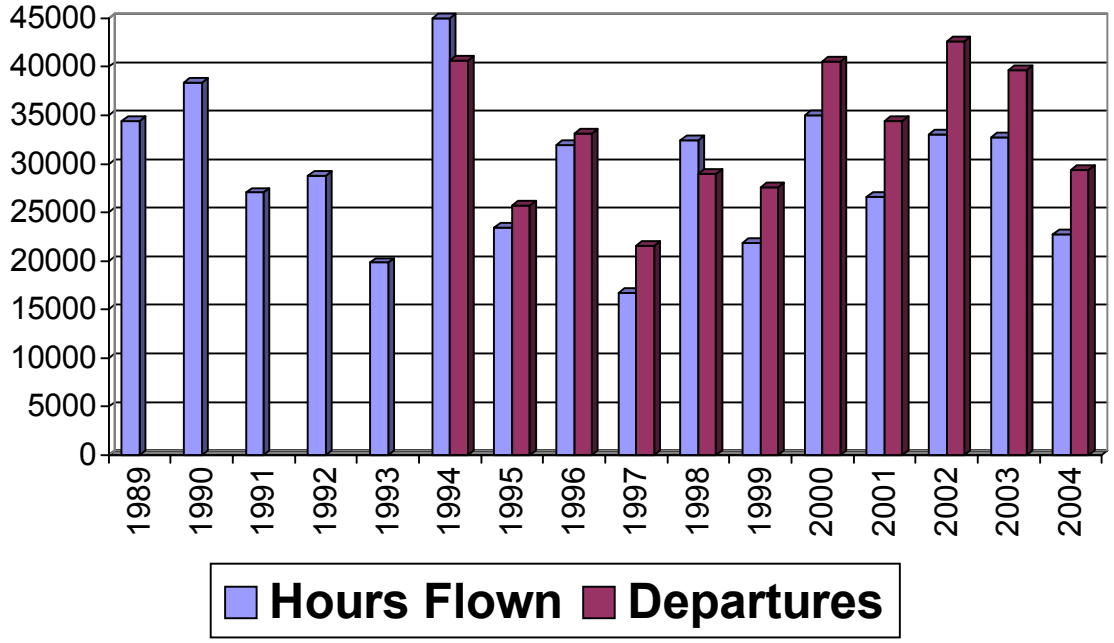
Fixed-Wing (Contract)

Fixed-Wing aircraft accounted for 36 percent of the total hours flown in FY 2004; the fifteen-year average is 44 percent. There were 22,713 hours flown in FY 2004, which is below the fifteen-year average of 29,094.

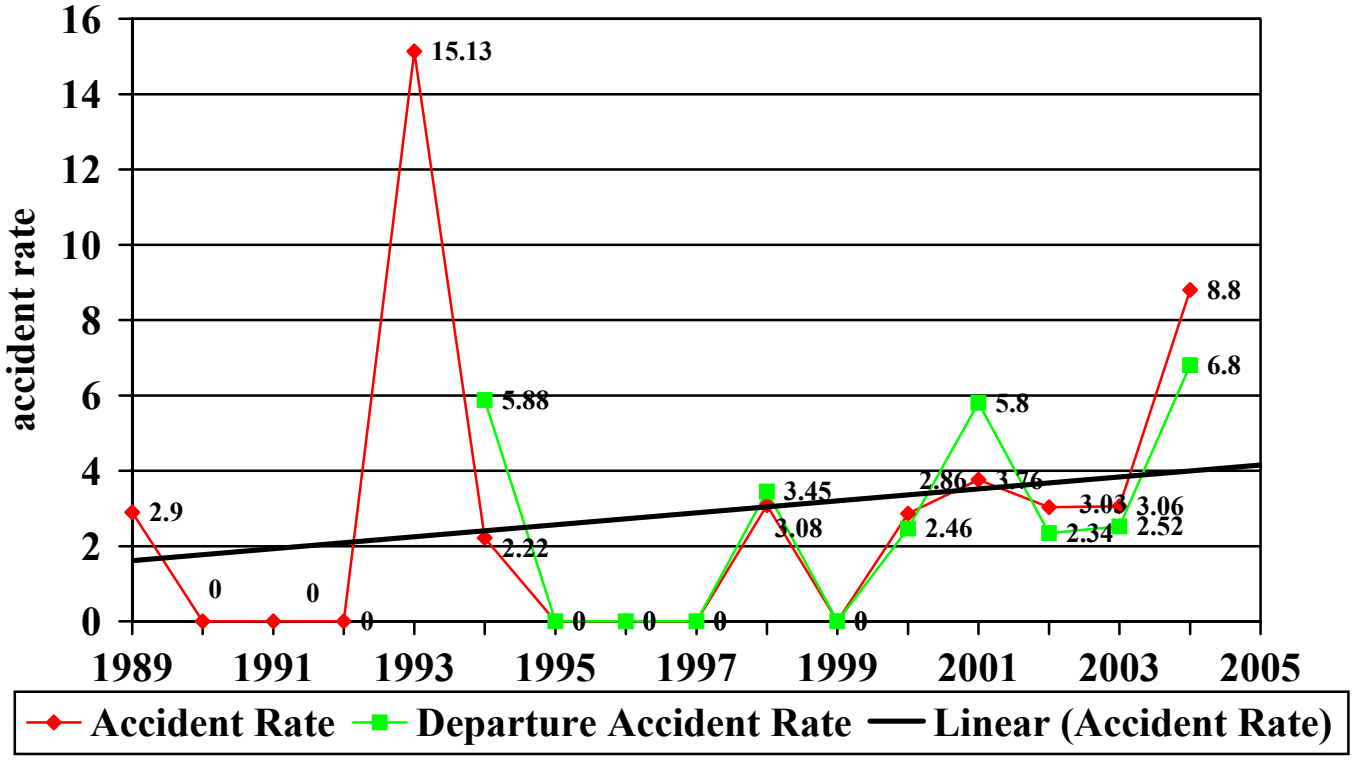
Fixed-Wing 15-Year Statistics

Fiscal Year	Hours Flown	Accidents	Accident Rate	Fatal Accidents	Fatal Accident Rate	Fatalities	Fatality Rate
2004	22,713	2	8.80	1	4.40	3	13.2
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
Total	436,408	11		3		9	
Average	29,094	0.73	2.80	0.2	0.82	0.06	2.61

Fixed-Wing Hours Flown and Number of Departures



Fixed-Wing (Contract) Aircraft Accident Rates 1989 to 2004

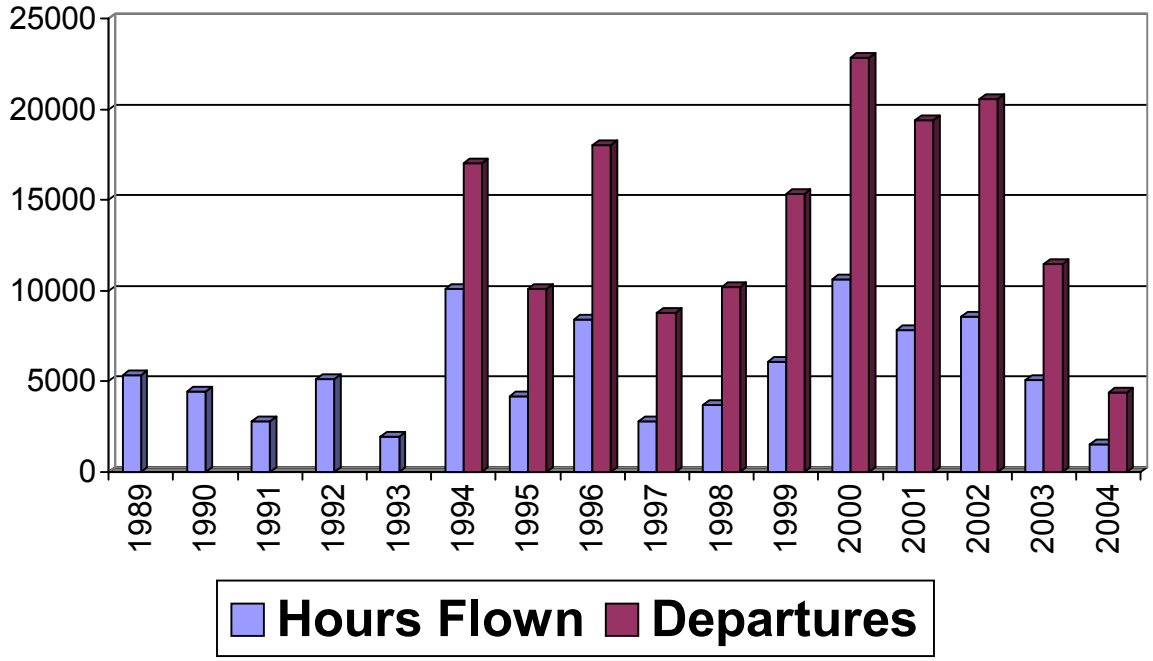


Airtankers

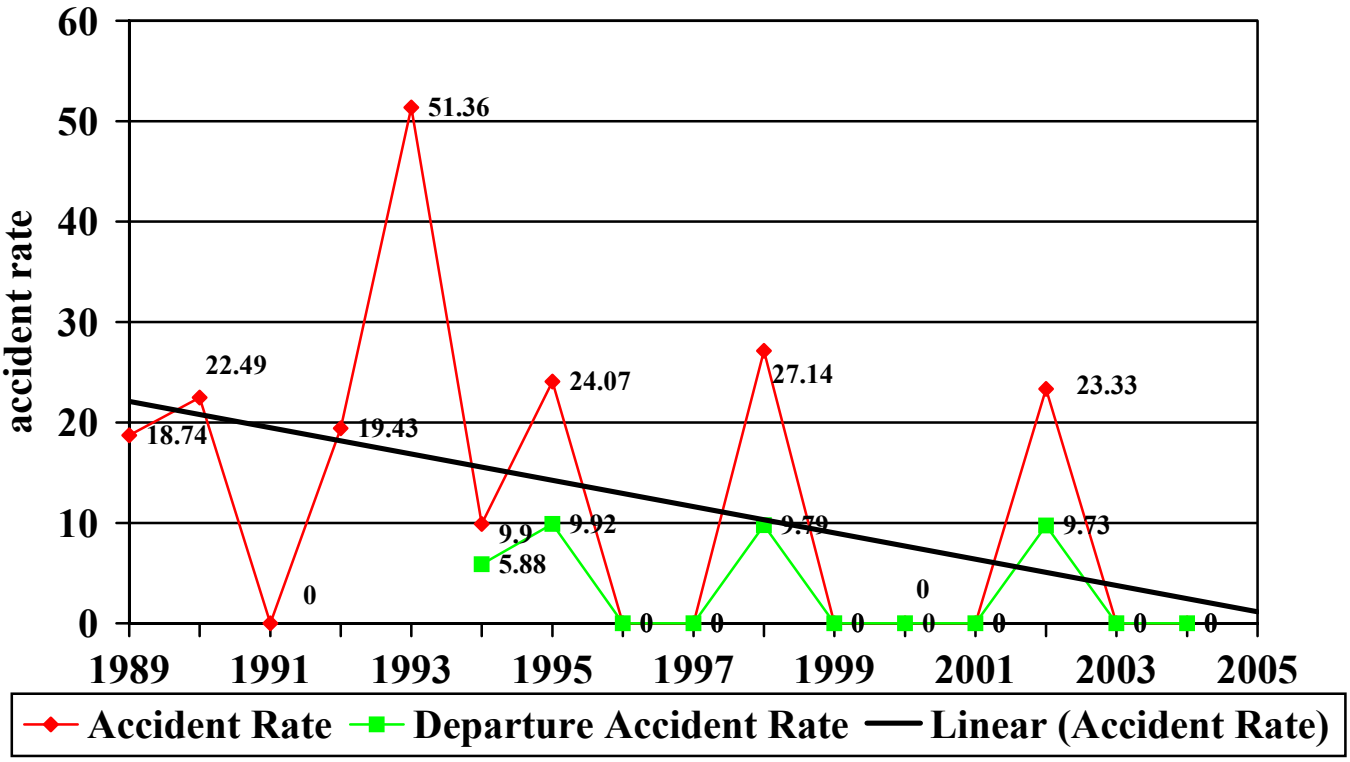
Airtankers accounted for 2.5 percent of the total hours flown in FY 2004; which is well below the fifteen-year average of 8%.

Airtanker 15-Year Statistics							
Fiscal Year	**Hours Flown**	**Accidents**	**Accident Rate**	**Fatal Accidents**	**Fatal Accident Rate**	**Fatalities**	**Fatality Rate**
2004	1535	0	0.00	0	0.00	0	0.00
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
Total	83,176	8		8		17	
Average	5,545	0.53	11.85	0.53	11.85	1.13	24.47

Airtankers Hours Flown and Number of Departures



Airtanker Accident Rates 1989 to 2004

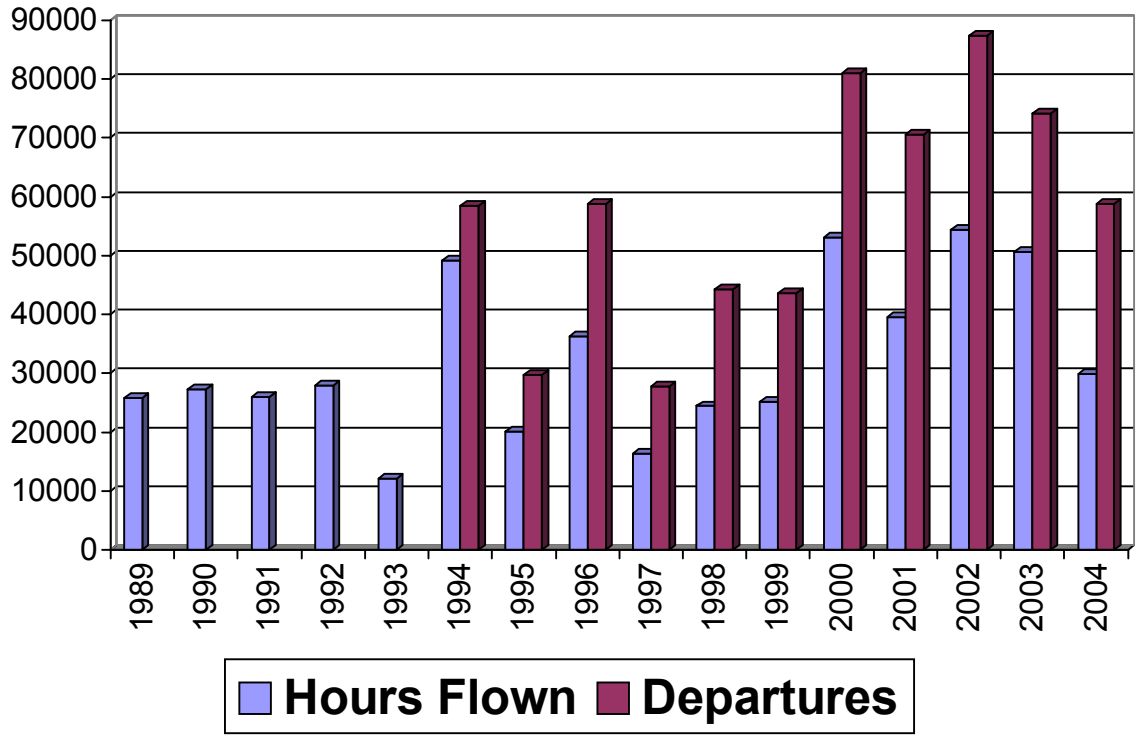


Helicopters

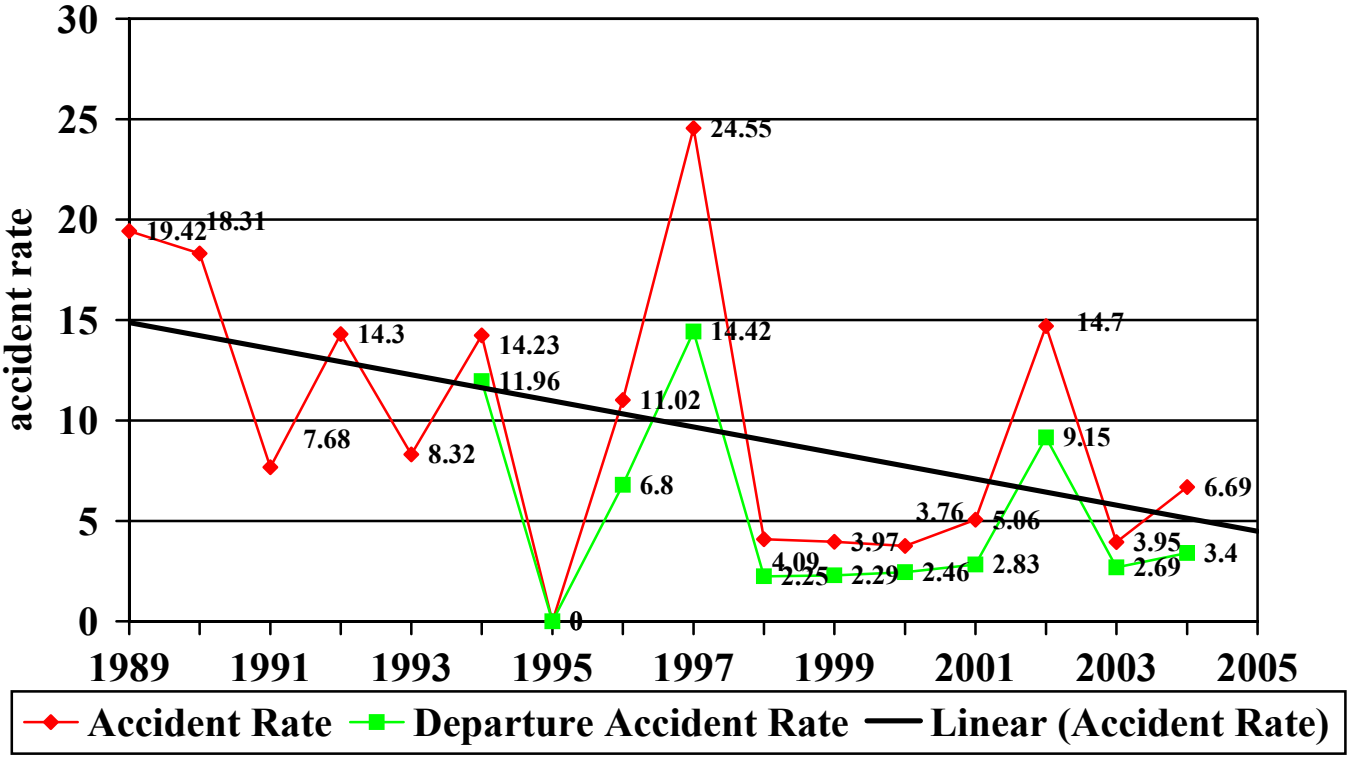
Helicopters accounted for the largest percent of the total hours flown in FY 2004. They flew 48 percent of the total hours flown in FY 2004. The 15-year average is 33 percent. The average number of accidents is three; we experienced 2 in FY 2004.

Helicopter 15-Year Statistics							
Fiscal Year	**Hours Flown**	**Accidents**	**Accident Rate**	**Fatal Accidents**	**Fatal Accident Rates**	**Fatalities**	**Fatality Rate**
2004	29,885	2	6.69	1	3.34	1	3.34
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
Total	492,386	45		9		13	
Average	32,826	3	9.37	0.60	1.82	0.87	2.77

Helicopters Hours Flown and Number of Departures



Helicopter Accident Rates 1989 to 2004



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 before a mishap occurs.

In 2004 the Forest Service and DOI Aviation Management Directorate combined SAFECOM databases. There were a total of 906 SAFECOM's submitted to the Interagency SAFECOM internet database of which 20 were duplicates, leaving a total of 883. These include all DOI bureaus, States, Military and unknown.

The following charts trend the Forest Service SAFECOM data submitted to the Interagency SAFECOM Internet database at http://www.safecom.gov/. The average number of Forest Service SAFECOM's submitted is 665 per year. In FY 2004 the number of Forest Service SAFECOM's submitted was significantly lower at 506, of which 12 were duplicates, giving us a total of 494.

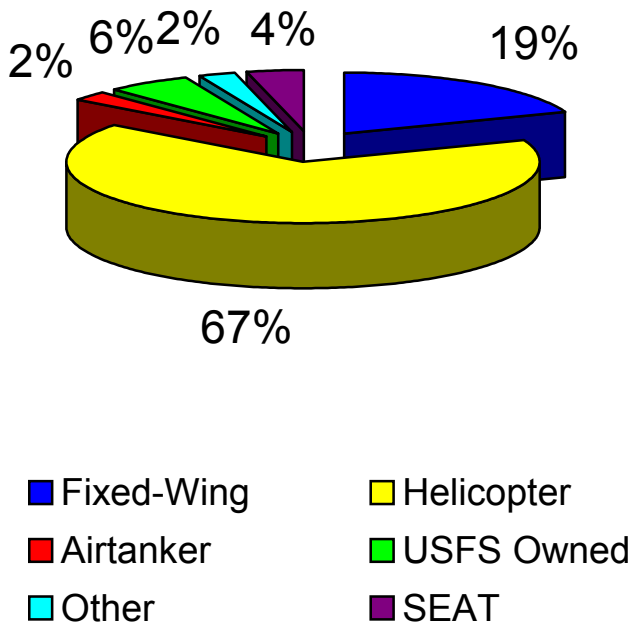
The five most reported SAFECOM's were engine, communications, policy deviation, dropped load and intrusion. In an analysis of the past five years policy deviation had dropped off the top five last year, but was the second highest in FY04. These same top five SAFECOM's have been consistent issues through the past 5 years.

Yearly Forest Service SAFECOM Totals	
YEAR	Number of SAFECOM's
2004	494
2003	887
2002	962
2001	773
2000	949
1999	640
1998	546
1997	366
1996	633
1995	402
Total	6652
10 YR Average	665

Forest Service FY 2004 SAFECOM's by Aircraft Type

Aircraft Type		
Aircraft Type	Number	Percent of all SAFECOM's
Fixed Wing	95	19%
Helicopter	326	67%
Airtanker	12	2%
SEAT	19	4%
USFS Owned	30	6%
Other	12	2%
Total	494	100%

Percent of SafeCom's by Aircraft Type



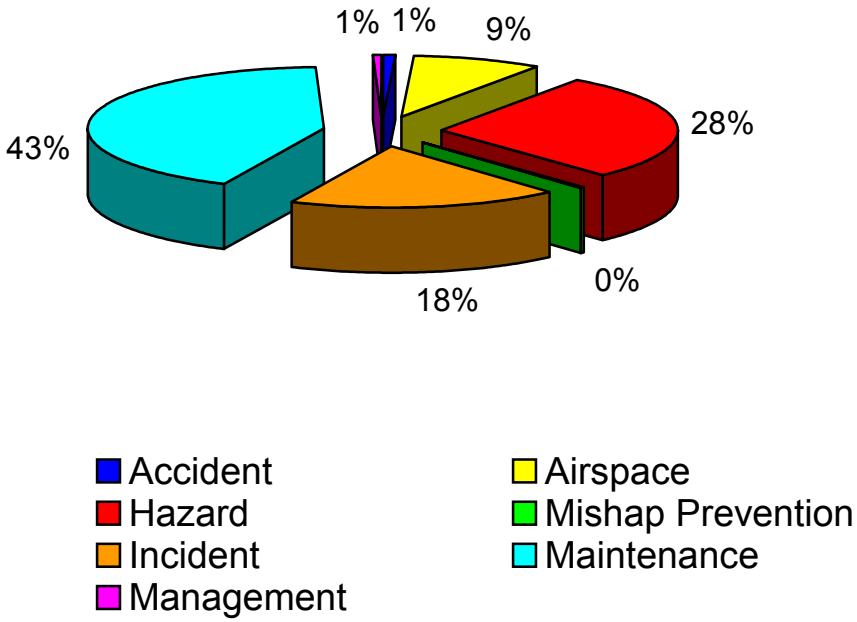
Forest Service FY 2004 SAFECOM's by Category

With the combining of the FS and DOI SAFECOM databases came some additional changes. There were three new main categories added and several more sub categories. The numbers of SAFECOM's by category will be more than the total number of SAFECOM's reported as each SAFECOM can now have more than one category assigned to it.

The total number of SAFECOM's reported in the Interagency SAFECOM database was 903, of which 20 were duplicates and not included in these statistics leaving a total of 883 SAFECOM's. There were 494 Forest Service, 330 DOI, 55 State, 1 Military and 3 Other SAFECOM's.

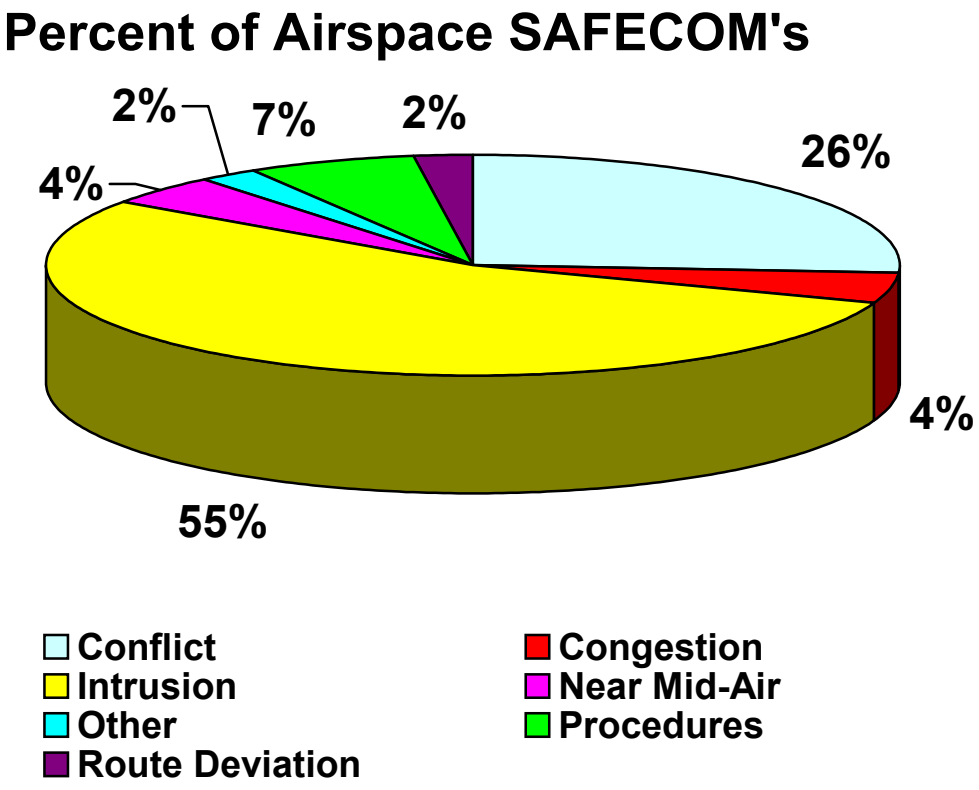
SAFECOM's by Category		
Category	Number	Percent of all SAFECOM's
Accident	5	1%
Airspace	46	9%
Hazard	147	28%
Incident	46	18%
Maintenance	221	43%
Management	3	1%
Mishap Prevention	2	0%
Total	520	100%

Percent of SafeCom's by Category

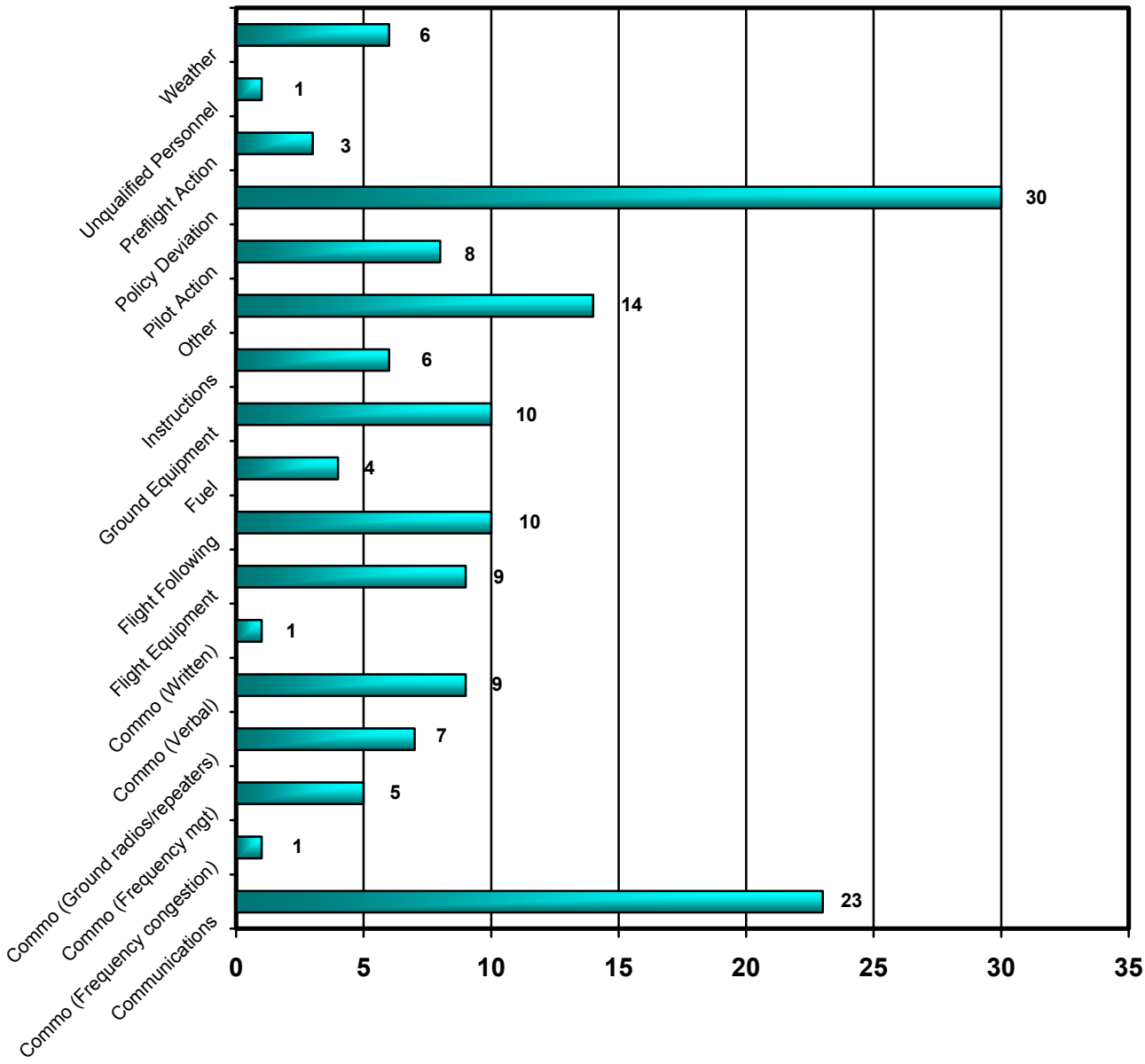


Forest Service FY 2004 Airspace SAFECOM's by sub-category

Airspace SAFECOM's by sub-category		
Category	Number	Percent of all SAFECOM's
Conflict	12	26%
Congestion	2	4%
Intrusion	25	55%
Near Mid-Air	2	4%
Other	1	2%
Procedures	3	7%
Route Deviation	1	2%
Total	46	100%

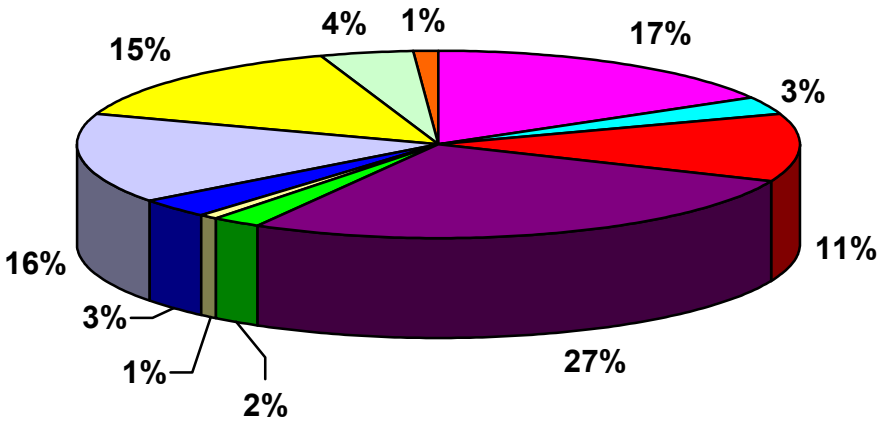


Forest Service FY 2004
Hazard SAFECOM's by sub-category

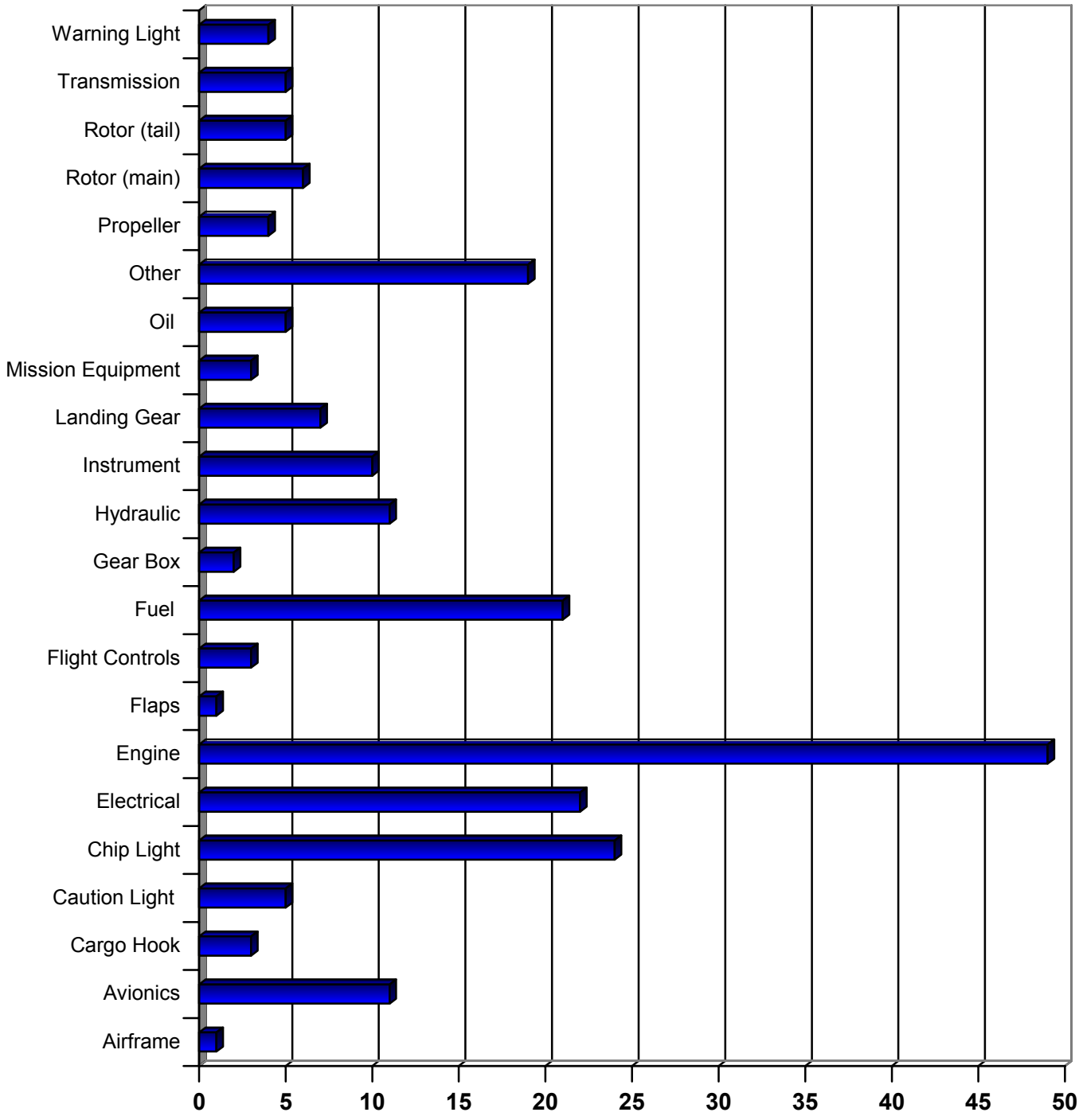


Forest Service FY 2004 Incident SAFECOM's by sub-category

Category	Number
Aircraft Damage	16
Bird Strike	3
Dragged Load	4
Dragged Load (Human Factor)	7
Dropped Load	11
Dropped Load (Human Factor)	10
Dropped Load (Mechanical)	5
Gear Up Landing	2
Ground Damage	1
Injury	3
Other	15
Precautionary Landing	7
Precautionary Landing (Crew)	1
Precautionary Landing (Mechanical)	6
Rotor Strike (Main)	3
Rotor Strike (Tail)	1
Security	1
Total	46



Forest Service FY 2004 Maintenance SAFECOM's by sub-category



Forest Service FY 2004 Management SAFECOM's by sub-category

Category	Number
External	2
Internal	1
Total	3

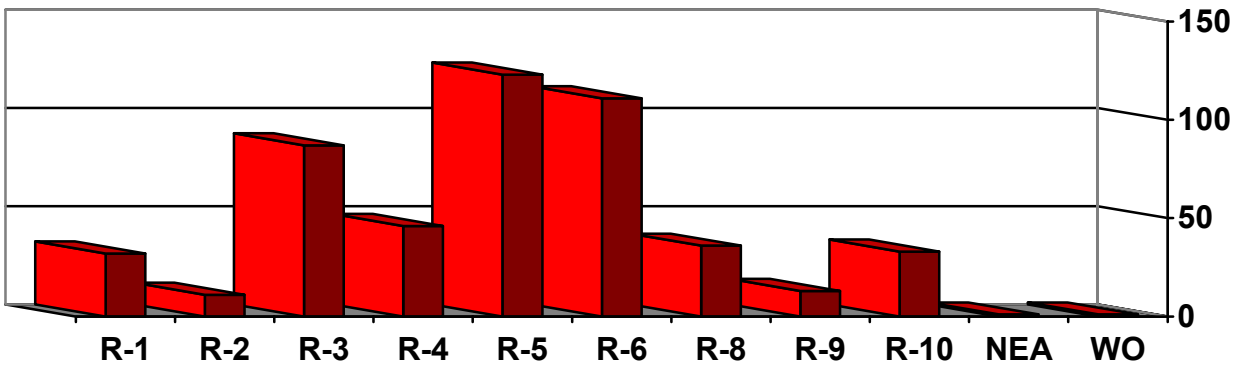
Forest Service FY 2004 Mishap Prevention SAFECOM's by sub-category

There were two SAFECOM's submitted that were categorized as Mishap Prevention and personnel involved in both of the situations received AIRWARDS.

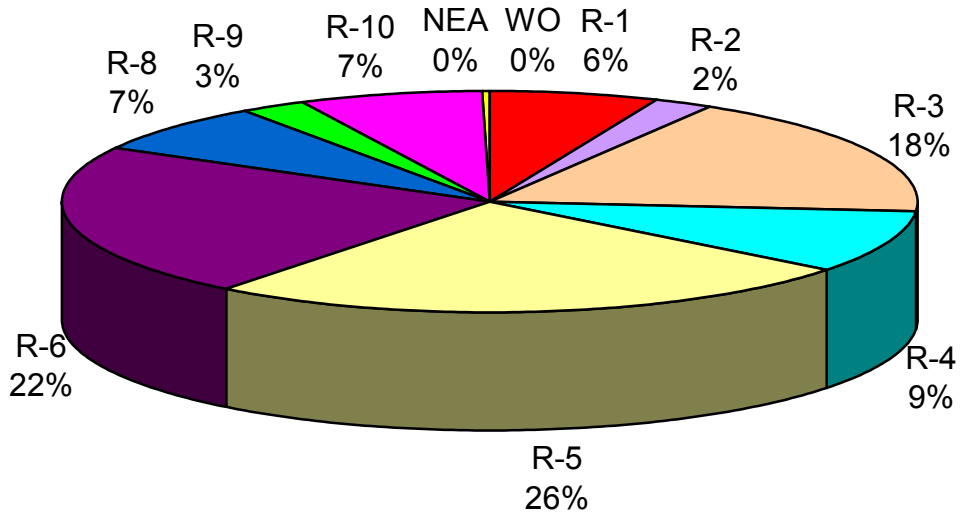
Category	Number
Kudos	2
Total	2

SAFECOM's by Region

The chart below shows the number of Forest Service SAFECOM's by region reported in FY 2004.



Percent of Safecoms by Region



FY 2004 SAFECOM's by Aircraft Type and Region							
Region	Fixed-Wing	Helicopter	Airtanker	SEAT	USFS Owned	N/A	Total
Region 1	5	21	0	2	4	0	32
Region 2	3	6	0	0	2	0	11
Region 3	14	53	2	9	8	1	87
Region 4	7	27	2	1	8	1	46
Region 5	22	87	4	2	3	5	123
Region 6	18	80	3	4	1	4	111
Region 8	8	27	0	1	2	0	36
Region 9	2	9	0	0	1	0	13
Region 10	15	16	0	0	1	1	33
NEA	1	0	0	0	0	0	1
WO	0	0	1	0	0	0	1
Total	95	326	12	19	30	12	494

FY 2004 SAFECOM's by Category and Region								
Region	Accident	Airspace	Hazard	Incident	Maint.	Mgt.	Mishap Prevent	Total
1	1	1	15	6	20	0	0	43
2	0	0	3	5	4	0	0	12
3	0	10	33	20	33	1	0	97
4	0	1	23	9	14	0	1	48
5	0	15	28	17	63	2	0	125
6	3	14	24	20	49	0	1	111
8	1	4	2	10	19	0	0	36
9	0	0	8	4	1	0	0	13
10	0	1	10	5	17	0	0	33
NEA	0	0	0	0	1	0	0	1
WO	0	0	1	0	0	0	0	1
Total	5	46	147	96	221	3	2	520

2004 Accident Review

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

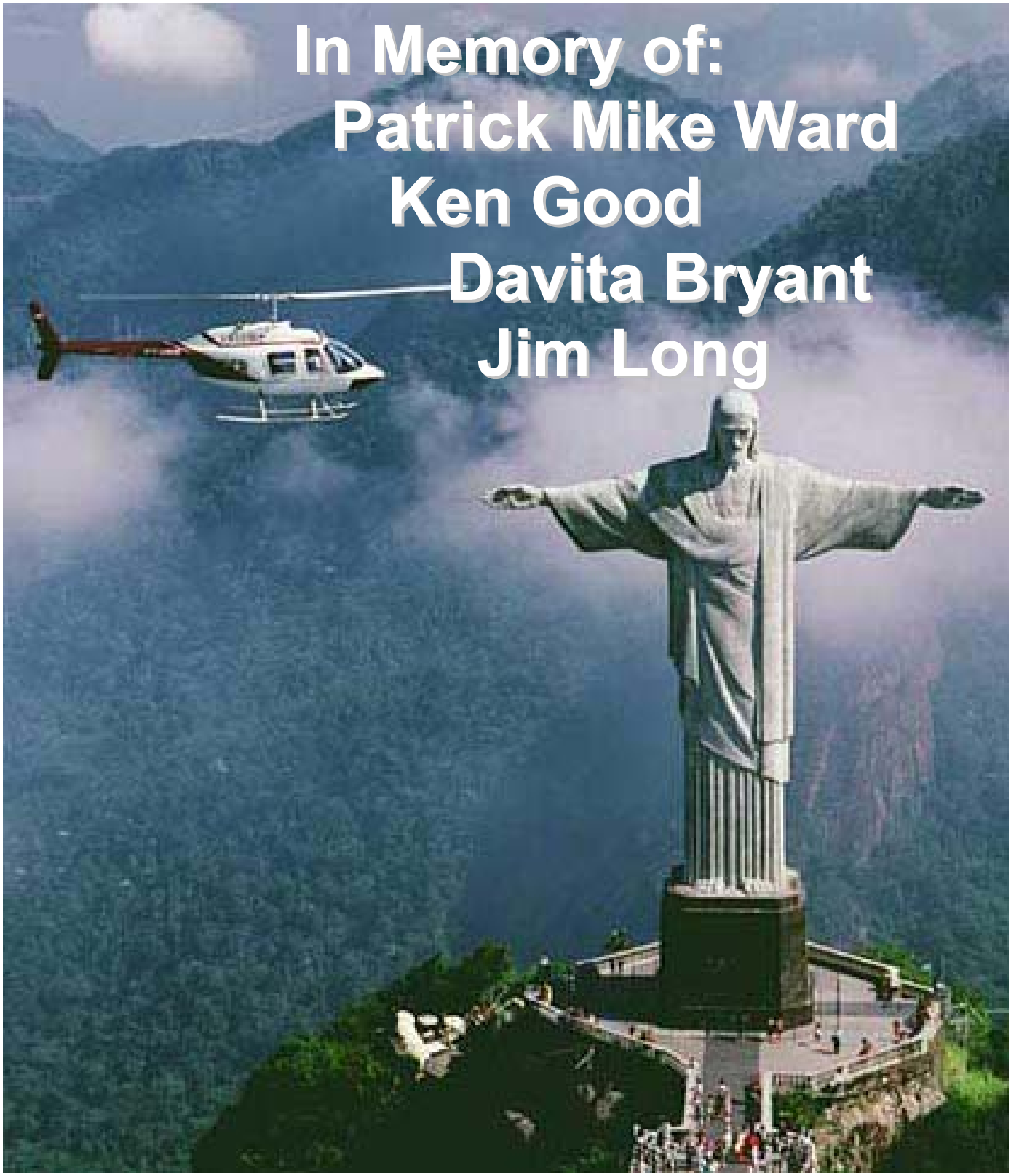
Over the past 40 years, more than 80% of accidents and incidents may have been preventable through the proper application of Human Factors principles and a change in Aviation Safety Culture.

The Forest Service experienced five accidents in the 2004 fiscal year. All of the accidents involved human error. There were four fatalities and two 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. The Forest Service is currently in the process of developing a HFACS database which we will enter the checklists that our investigators have been completing over the past few years, as well as going back through our other accident reports and gathering and entering the data.

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:
Patrick Mike Ward
Ken Good
Davita Bryant
Jim Long

Region 6, Regional Air Group

NTSB Identification: **SEA04LA029**.
Accident occurred Monday, December 22, 2003 in Missoula, MT
Aircraft: Beech 58P, registration: N181AM
Injuries: 1 Minor, 1 Uninjured.

The aircraft departed Redmond, OR transporting two passengers to Missoula, MT. After dropping off the passengers in Missoula, the mission was then changed to pilot training for the return flight from Missoula to Redmond.

Shortly after take off during night instrument meteorological conditions the flying pilot reported that he made a right turn from runway heading at about 400 to 500 feet above ground level to intercept the outbound radial from the VOR to accomplish the departure procedure.

The second pilot, who had no previous flight time in this make and model aircraft and was the flying pilot,

During the turn, a "thump" was felt and the right bank angle increased from about 25 degrees to 45 degrees. While the second pilot was attempting to correct from the increased bank angle, the aircraft at some point, entered a descent.

Mishap Site 12/23/2003

Just before ground impact to open terrain about one mile south of the runway, the pilot-in-command took control of the aircraft to level the wings.

The aircraft skipped across the open terrain for several hundred yards before coming to rest on its belly. The aircraft was consumed by fire shortly thereafter.

Empennage, looking in direction of landing

Neither pilot could explain the loss of altitude as both believed they were in a continuous climb during the event as airspeed and pitch attitude remained constant. Neither pilot could recall if they scanned the vertical speed indicator or altimeter to verify if they were indicating a climb or descent.

During the post accident inspection of the aircraft, no evidence of a mechanical failure or malfunction was found and no evidence of an in flight collision with an object was noted. At the time of the accident, low freezing fog and visibility was reported.

NTSB Probable Cause: The second pilot's failure to maintain terrain clearance while maneuvering after takeoff. Proper climb rate not verified by the flight crew, fog, freezing fog, dark night conditions and inadequate supervision by the pilot-in-command were factors.

Accident Review Board Action Items

- Perform a review of R6 standards and practices for pilot training to ensure adequacy, compliance with national standards (where applicable), and implementation. Correct identified deficiencies.
- Request an outside resource (i.e. GSA-ICAP) to evaluate the R6 aviation management and flight operations program.
- Re-emphasize the importance of aviation site reviews nationally. Develop an aviation site review schedule for all regions and provide this information to the Directors of FAM and RAO's.
- Rewrite national policy in the FSH 5709.16 to require a formal risk assessment process and go-no-go decision-making prior to each fixed wing flight.
- Standardize pilot training and proficiency through a centralized, national-level process and establish and maintain a database for record keeping.
- Rewrite policy in FSH 5709.16 to establish IFR takeoff minimums for visibility, ceiling, icing conditions, and safe return to the airport of departure in case of emergency.

Region 8, LBJ National Grasslands

NTSB Identification: **FTW04TA075**.
Accident occurred Wednesday, February 18, 2004 in Decatur, TX
Aircraft: Bell 206B, registration: N16MV
Injuries: 1 Minor.

The helicopter was providing aerial ignition and external load (water bucket) supporting a prescribed burn. The helicopter utilized both a Plastic Sphere Dispenser and a 108-gallon Bambi Bucket.

During lift off from soft uneven terrain, the rear portion of the helicopter's right main skid came in contact with the ground resulting in a dynamic rollover. The pilot reported that the terrain he departed from was "clumpy and lumpy with ruts of grass approximately 1 to 2 feet in height."

As he started to lift the helicopter off the ground, he made a slow ascent rate. When the skids were about 1 foot above the ground, he said, "the helicopter stopped for a split second as if something had caught some portion of the right side of the helicopter and the helicopter began a slight lateral roll to the right."

The pilot further reported that he recognized the problem too late as he applied full left cyclic and lowered the collective after the helicopter exceeded the critical angle of bank into the low skid to a point where the situation was unrecoverable, and it rolled 90 degrees to the right.

No mechanical deficiencies with the engine or airframe were noted

The Rotorcraft Flying Handbook (FAA-H-8083-21), page 11-7, described dynamic rollover as, "the pivoting around a skid or landing gear wheel of a helicopter causing it to reach its critical rollover angle. Beyond this point, main rotor thrust continues the roll and recovery is impossible."

NTSB Probable Cause: The pilot's failure to maintain control of the helicopter during liftoff after encountering dynamic rollover. A contributing factor was the rough and uneven terrain.

Accident Review Board Action Items

- The agency should establish minimum Training, evaluation and certification for entry-level helicopter pilots performing aviation natural resource missions including external load missions
- The agency should re-assess the role of and need for a Marshaller/Parking Tender under the various missions. (This recommendation is currently being addressed by the agency, and is expected to be finalized in 2005)
- With a significant number of dynamic rollover events occurring on flatland terrain, we recommend the Agency review the data for dynamic rollover events, determine if there is a cause and effect situation, and recommend actions be taken as needed.

Region 6, Malheur National Forest

NTSB Identification: **SEA04TA147**.
Accident occurred Monday, July 26, 2004 in Burns, OR
Aircraft: WSK PZL Mielec M-18A, registration: N495WP
Injuries: 1 Uninjured.

The aircraft was delivering retardant to the Tenant fire approximately 20 miles northwest of Burns, OR.

The pilot was attempting to climb following a fire retardant drop. When he moved the throttle forward, the engine did not respond. The airplane started loosing altitude, and the pilot performed a forced landing to an open plateau. During the landing, the throttle would not retard all the way.

In order to land the airplane, the pilot turned the fuel selector to the off position. During the landing roll, the left wing impacted a fence pole bending ribs and wrinkling the aileron. Post accident examination revealed that the bolt normally connecting the throttle linkage clevis to the throttle arm was missing.

The investigating team examined a sister aircraft from the same provider. They found that a nylon lock nut had been installed on the clevis bolt, and it was loose enough to be removed without the aid of any tools.

Bent ribs and wrinkled aileron

The industry standard, found in FAA Advisory Circular AC43.13-1B, chapter 7, section 4, paragraph 7-64, states that nylon locking nuts should not be used with rotating components or assemblies. It further states that nylon and/or fiber nuts are highly susceptible to wear from repetitive use and from high heat applications.

NTSB Probable Cause: The improper installation of the throttle linkage clevis to the throttle control arm by unknown maintenance personnel. Contributing factors were the nylon lock nut separating from its' bolt, which permitted the throttle cable to disconnect from the throttle control arm, and the fence post.

Accident Review Board Action Items

- Re-inspect aircraft operated by vendor.
- Establish contractual requirements for maintenance of SEAT aircraft equivalent to other interagency fire aircraft.
- Conduct a risk analysis and develop mitigation measures for Forest Service use of SEAT's.
- Establish an interagency working group to conduct an operational analysis of SEAT's and develop use standards.
- Establish policy based on the risk and operational uses analyses.

Region 6, Okanogan & Wenatchee National Forests

NTSB Identification: **SEA04TA158**
Accident occurred Wednesday, August 11, 2004 in Leavenworth, WA
Aircraft: Bell 205A1, registration: N205XP
Injuries: 1 Fatal.

The aircraft was delivering supplies to smokejumpers in the Alpine Lakes Wilderness, approximately 20 miles northwest of Leavenworth, WA via a 150 foot longline.

Visual meteorological conditions prevailed. The flight departed from the USFS Leavenworth helibase (Fromme Field) approximately 0955.

The helicopter was destroyed and the pilot was fatally injured when it impacted heavily wooded, mountainous terrain. Prior to the impact, the helicopter's tail rotor struck a tree and aircraft control was lost while maneuvering to deliver an external load.

The helicopter was carrying a dual sling load on a long line. The pilot put the first load down without incident. He set the second load down, but then lifted it again, moved a short distance, and set it down again.

Both loads were then unhooked from the longline by a ground crewman. One load was re-hooked to the longline to go to another fire. The pilot was given the thumbs up that the load was re-hooked and the crewman was clear of the aircraft.

The helicopter then started to ascend, and at that time, the helicopter's tail rotor contacted a dead snag. When the tail rotor contacted the snag, the helicopter was about 150 feet above the ground.

The helicopter began to spin, the main rotor blades struck other trees, and the helicopter fell to the ground.

A post-crash fire erupted, which consumed the fuselage of the helicopter.

NTSB Probable Cause: NTSB has not yet determined the probable cause.

Accident Review Board Action Items

- Revise the IHOG Longline Procedures and Forest Service Operations and Safety Procedures Guide for Helicopter Pilots to state: In areas of sloping terrain or with obstacles rising to one or more sides of the cargo pickup/delivery area, or dip site, pilot shall maintain rotor clearance from all obstacles equivalent to the IHOG Chart 8-1 landing area safety circle requirements. When specified clearance cannot be maintained, the mission shall be declined by the pilot until hazards are removed, additional line can be added or a better location can be identified.
- Implement nationally a longline training and certification process for firefighters assigned to direct operations at helicopter drop zones.
- Include the following in the national and regional longline training:
  1. Tree height measurement
  2. Hazard recognition
  3. Positive air to ground communication requirements Incorporate tree height estimation training in all longline operations training (triangulation or use of clinometers).
- Reevaluate the use of drop zone markers in light of the hazard of target fixation.

Region 1, Flathead National Forest and Washington Office, Rocky Mountain Research Station

NTSB Identification: **SEA04GA192**
Accident occurred Monday, September 20, 2004 in Essex, MT
Aircraft: Cessna U206G, registration: N206SM
Injuries: 3 Fatal, 2 Serious.

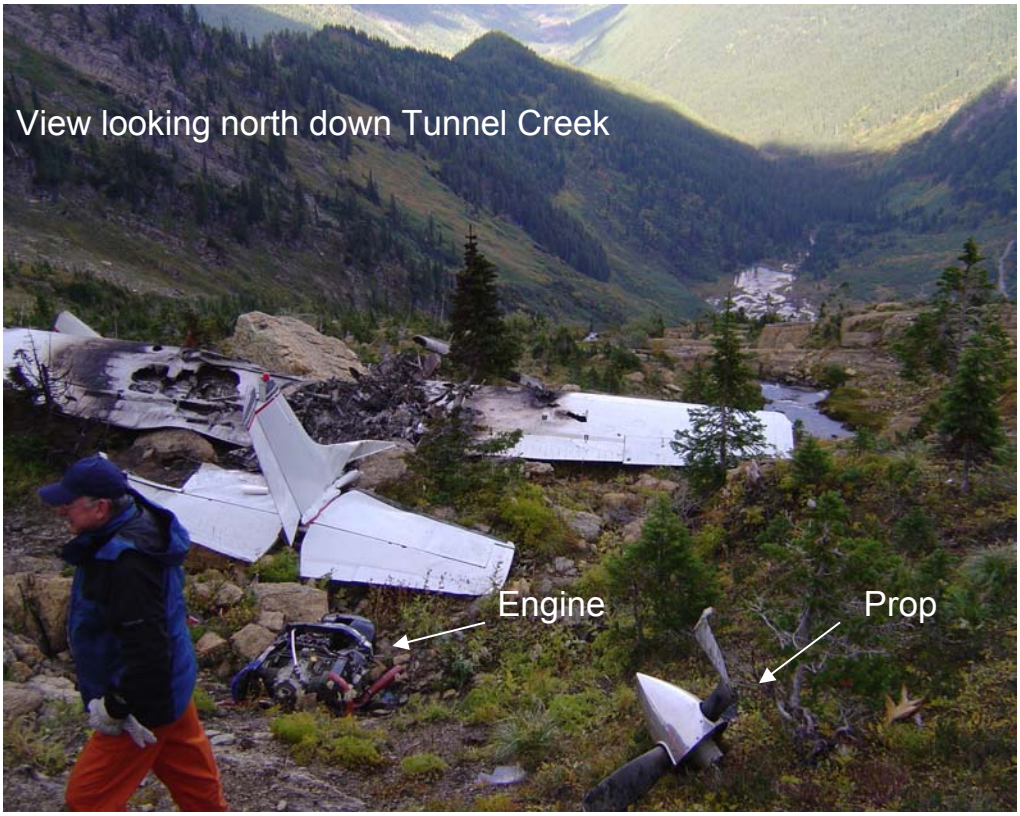
The aircraft departed Glacier Park International airport in Kalispell, MT transporting four USFS passengers to Shafer Meadows, MT, a USFS back country airstrip to perform a annual vegetation analysis and communications maintenance.

The aircraft departed Kalispell , MT on September 20, 2004, at approximately 1530 mountain daylight time the aircraft impacted mountainous terrain while maneuvering about 6 nautical miles northwest of Essex, Montana. The pilot and two USFS employees were killed, and the other two USFS employees sustained serious injuries.

Visual meteorological conditions prevailed for the airplane's departure at 1500 from Glacier Park International Airport in Kalispell. An FAA flight plan was not filed; however, the airplane was receiving flight following services from the USFS.

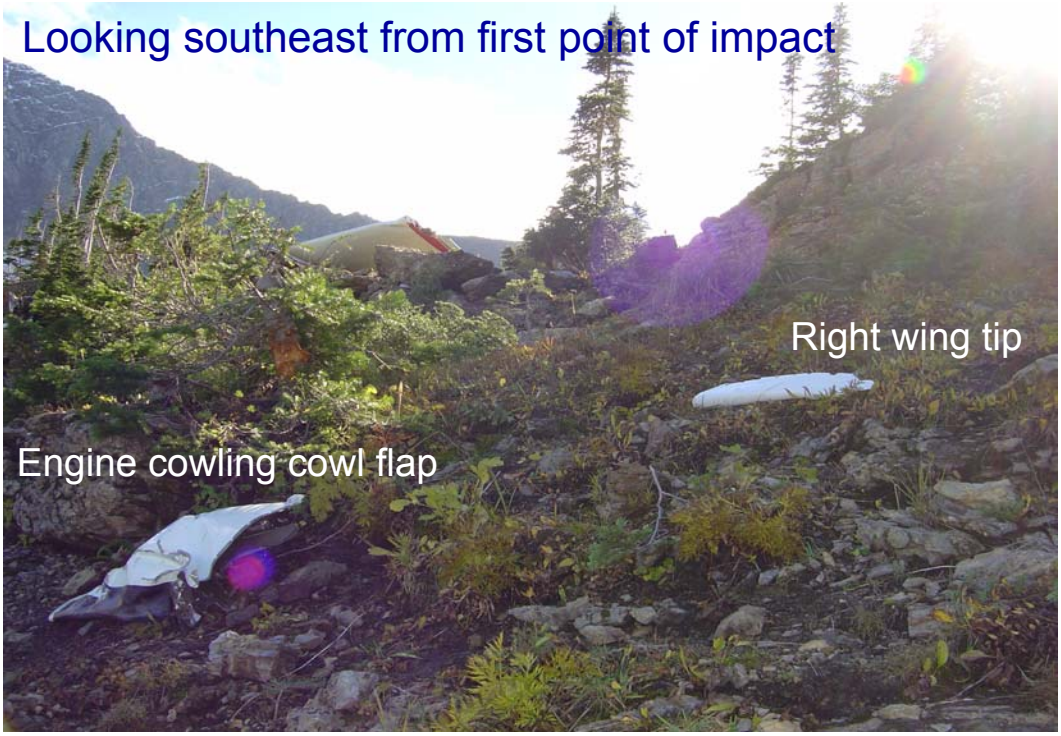
The flight was originally scheduled to depart at 1300. The scheduled departure was delayed from 1300 to 1500 due to weather conditions.

The planned route of flight was to follow Highway 2 from Glacier Airport to a point about 3 miles south of the town of Essex, where the highway and the Middle Fork of the Flathead River separate. At this point, the flight was to leave the highway and follow the Middle Fork drainage to Schafer.



The last contact Glacier Tower had with the airplane was at 1508, when the pilot reported that he was through "the canyon" (Badrock Canyon approximately 8 miles northeast of Glacier Airport) and switching to "backcountry frequency" (USFS dispatch). Examination of radar data confirmed that at 1508, the airplane was exiting Badrock Canyon heading northeast. Radar contact with the airplane was lost at this time due to mountainous terrain.

From Badrock Canyon, the airplane's planned route proceeded along Highway 2, which follows a large bend in the Middle Fork of the Flathead, heading first northeast, then east, and finally southeast towards Essex. At 1515, the airplane checked in with USFS dispatch, and the pilot reported his position as "Essex, inbound for Schafer." This was the last radio communication received from the airplane.



When the airplane did not check in with USFS dispatch as expected at 1530, a search was initiated. The wreckage of the airplane was spotted by ground searchers about 1345 on September 21, 2004. Search and rescue personnel reached the accident site via helicopter about 1510. The Deputy Coroner for Flathead County inspected the scene and announced that all five occupants were fatally injured. The ground search was suspended. Approximately 1430 on September 22, 2004, two survivors walked out of the Tunnel Creek drainage.

The airplane impacted rugged mountainous terrain near the head of the Tunnel Creek drainage of the Flathead Range at a Global Positioning System (GPS) location of 48 degrees 19.011 minutes North, 113 degrees 44.166 minutes West, and an elevation of 6,604 feet. The airplane came to rest in a sparsely wooded, rocky area on an upslope of 30 to 45 degrees. All major components of the airplane were accounted for in the main wreckage area. The debris path measured approximately 80 feet in length along a magnetic bearing of 165 degrees.

The fuselage with both wings attached came to rest inverted, and the empennage, which remained attached to the fuselage by control cables came to rest upright. The engine had separated from the firewall, and the propeller had separated from the engine crankshaft. All flight controls remained attached to their respective attach points, and control continuity was verified from the control surfaces to the cockpit controls. The cockpit, cabin and the inboard sections of both wings were destroyed by fire. All three propeller blades were bent and twisted, the blade tips were broken off, and the blade leading edges were gouged and scraped.

NTSB Probable Cause: NTSB has not yet determined the probable cause.

Accident Review Board Recommendations

- Review and modify as needed, current Forest Service requirements for backcountry pilot experience and approvals for appropriate requirements including a standard definition for “typical terrain.”

- Re-evaluate appropriate personal protective equipment (PPE) requirements for fixed wing backcountry flight operations.

- Place managerial emphasis on the full implementation as planned of the Automated Flight Following (AFF) program. Until this is fully implemented, latitude, longitude and heading reports should be required for check-in on all GPS equipped aircraft.