



IHST
International Helicopter Safety Team
US-JHSAT
CY2001 Analysis

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Overview

- Analysis Process
- Differences in Analysis Method
- Report Structure
- Comparison to CY2000
- Preliminary CY2006 Analysis
- Conclusions

Analysis Process

- Review the NTSB accident file
 - Develop the event sequence
 - *Identify occurrence types
 - Identify problems (Standard Problem Statements)
 - Identify interventions (Intervention Recommendations)
- Roll-up the SPS – IR pairs
- *Prioritize by the number of accidents in which they occur
- *Develop recommendations by Occurrence Type

* New in CY2001 analysis

Differences in Analysis Method

- More mature process allows for faster analysis
- Building on the analysis tool developed by EHEST
 - Minor differences in SPS and IR due to Operational differences
 - Coded Intervention Recommendations
 - Comment field used more extensively
- “Occurrence” taxonomy (adapted from ICAO)
- Recommendations are based on number of accidents in which the recommendation was made rather than frequency of use.

Occurrence Types

- JHSIT requested analysis by accident type
 - 80% of CY2000 recommendations applied to all
 - Needed a way to prioritize implementation tasks
- CAST/ICAO Common Taxonomy Terms
 - Taxonomy developed for transport airplanes
 - EHEST proposal to incorporate rotorcraft terms
 - US JHSAT modified taxonomy
 - Finer detail in occurrence type for targeted recommendations
- Helicopter Taxonomy Working Group

Occurrence Types

Primary Category

ADRM – Airport	ICE
AMAN – Abrupt Maneuver	LOC – Loss of Control
ARC – Abnormal Runway Contact	LZ – Landing Zone
AUTO – Autorotation	RAMP
CFIT	SCF – System/Component Failure
DITCH	STRIKE
DATA	UNK – Unknown/Other
EXTL – External Load	VIS - Visibility
FIRE	WSTRW – Windshear/Thunderstorm
FUEL	

Occurrence Types

Secondary Category Example

PM - Performance Management

TD - Tie-downs/hoses

DR - Dynamic Rollover

SP - Settling w/ power

OL - Exceeding Operating Limits

Loss of Control

GR - Ground Resonance

EP - Emergency Procedures

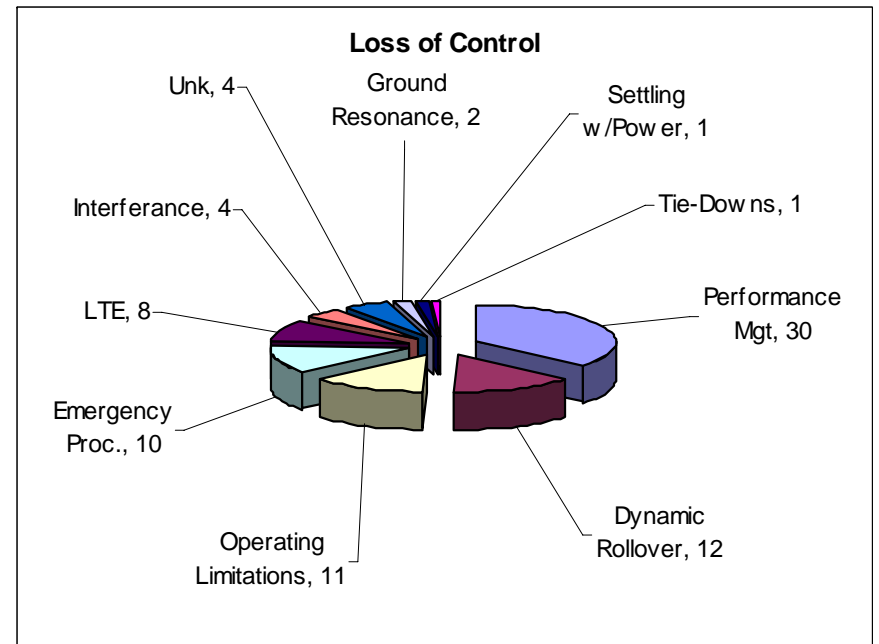
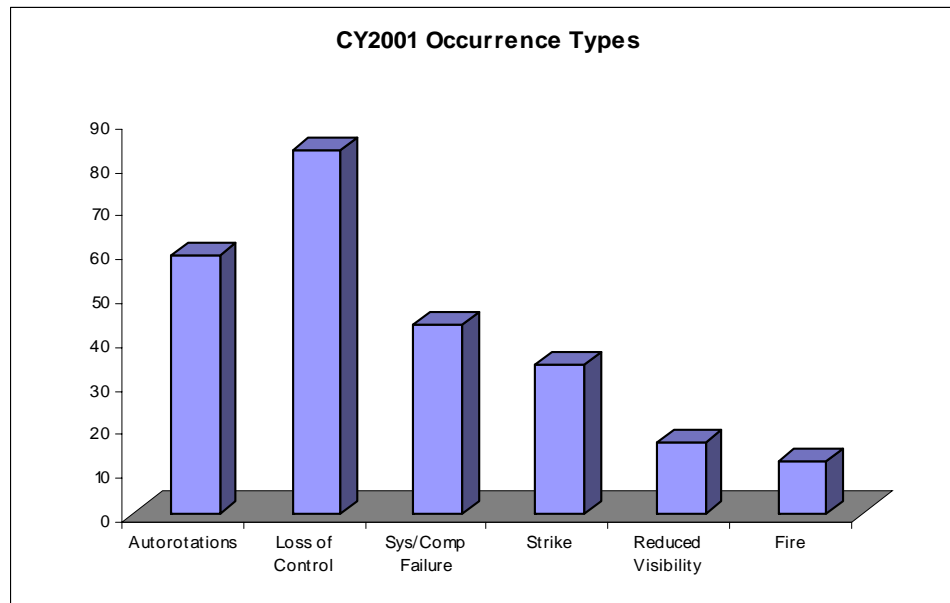
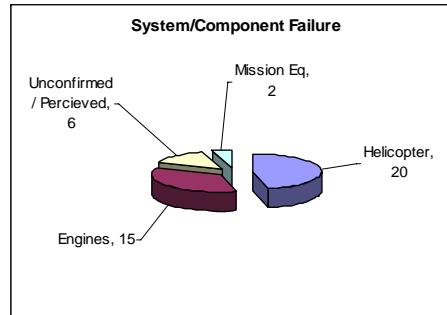
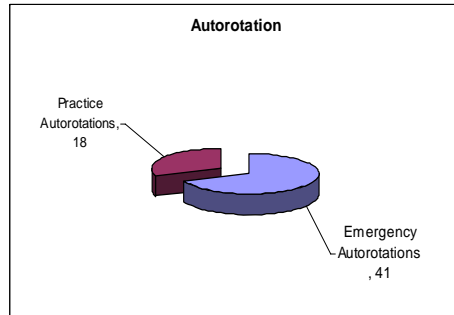
UNK - Unknown

LTE - Loss of T/R Effectiveness

INT - Interference with Controls



CY2001 Occurrence Types



Report Structure

- Sections for each Occurrence Type
 - Definition
 - Characteristics
 - Standard Problem Statements
 - Intervention Recommendations
 - Relationships to other Occurrence Types
 - Comparison between CY2000 and CY2001
 - Conclusion
 - Recommendations
- Overall Comparison to CY2000
- Recommendations for CY2001
- Appendix D – Occurrence Category by Mission Summary

LOC-PM Occurrence

- Occurred in 10 mission categories. Training and Personal flying had greatest involvement.
- Practice autorotations – improper airspeed and/or rotor rpm not maintained. CFI – late interventions.
- Abrupt/inappropriate control handling
- Planning - Inappropriate consideration of tailwind or density altitude (high, heavy, and hot)
- Decision-making – Hover out of ground effect
- Inadvertent descent

LOC-PM Recommendations

- Enhanced CFI initial/recurrent training with emphasis on best practices, power management, control handling, and decision-making cues for when to intervene
- Training emphasis on common operational errors and awareness of cues critical for safe flight
- Acquire and use simulators (or training devices) to improve training quality and reduce risk in training.
- Greater emphasis on power management in all training maneuvers – especially autorotations
- Provide risk awareness/management training, with focus mission risk. Provide SOP and oversight to reduce mission risk.

SCF Occurrence

- 37 confirmed part/system failure events (21% of all accidents).
- 29/37 accidents (78%) involved maintenance factors, most often non-compliance with instructions for continued airworthiness (ICA) and/or inadequate quality assurance.
- 8 events (7 airframe parts, 1 mission component) could have been prevented by a proper preflight inspection.
- 6 events could have been detected by vibration monitoring or power-available indicators.

SCF Recommendations

- More in-depth investigation of non-compliance with ICA. Better dissemination of information addressing underlying reasons of non-compliance with ICA.
- Improved maintenance QA and record-keeping.
- Better regulatory oversight of maintenance
- Implementation of maintenance data monitoring systems
- Safety training to ensure proper preflight inspections of aircraft and mission equipment
- Provide terminating action for ADs rather than recurrent inspections
- Establish higher standards for maintenance of public-use aircraft

Autorotation Occurrence

- 59 events (34% of all accidents).
 - Roughly half occurred on training or personal flights
 - Others in 12 different mission categories
- 41 emergency autorotations (following SCF, fuel contamination, or starvation)
- 18 practice autorotations (improper control/handling in descent, late/improper flare, and/or unsuitable terrain issues)
- Pilot judgment and situational awareness factors led pilot factors

Autorotation Recommendations

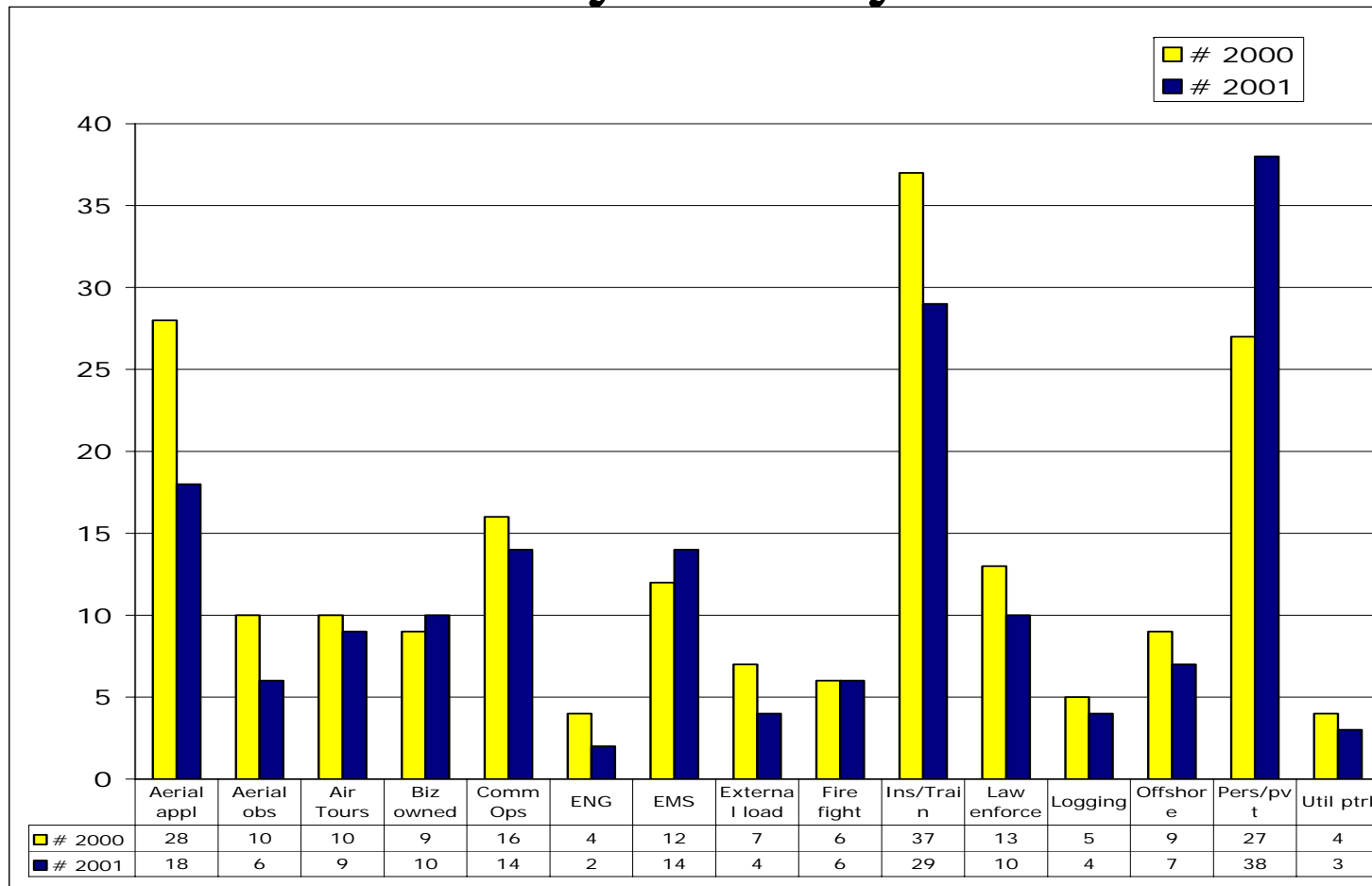
- Ensure that basic and advanced training programs address decision-making skills for selecting autorotation landing sites and control handling for optimum power management
- Ensure that pilots have the opportunity to maintain autorotation proficiency after completion of transition or mission training
- Improve training by making use of flight simulators to learn procedural skills coupled with knowledge of aircraft performance characteristics.

Comparison to CY2000 Data Set

- Definition of data set same as CY2000
 - U.S. civil registered helicopters
 - Type certificated (amateur built rotorcraft excluded)
 - Includes 'Public Use' and Restricted category
- CY2000 – 197 accidents
- CY2001 – 174 accidents
- CY2006 – 152 accidents

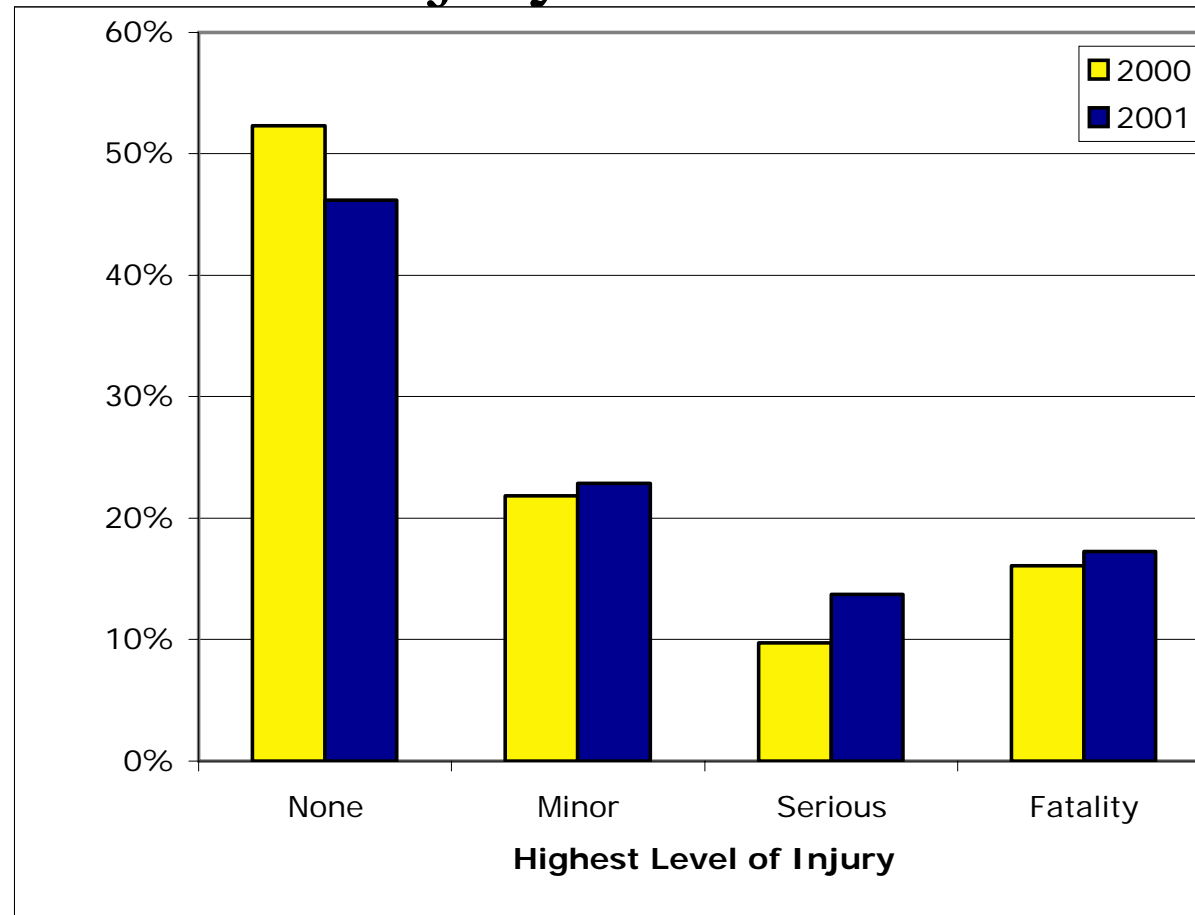
Comparison to CY2000

Accidents by Primary Mission

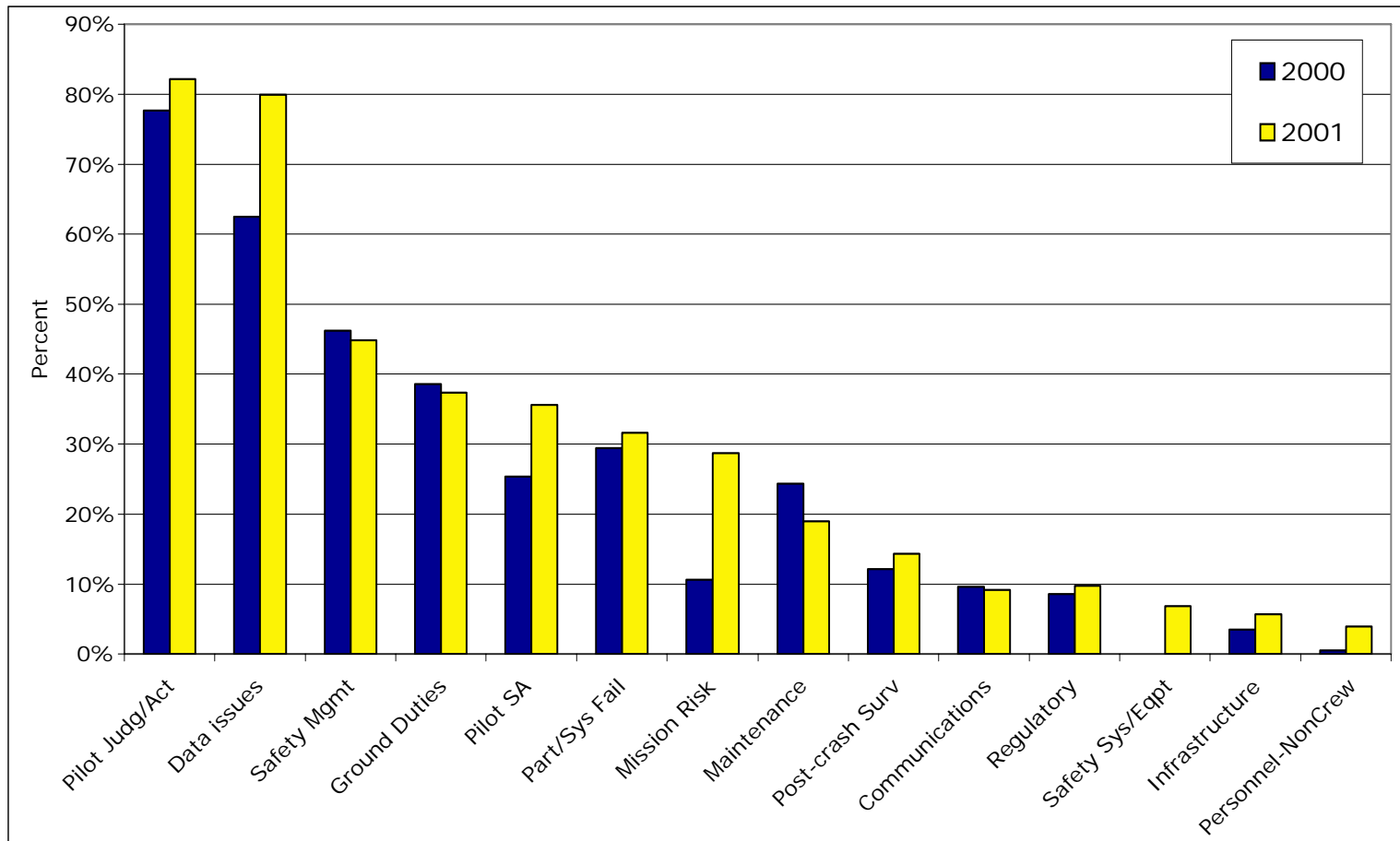


Comparison to CY2000

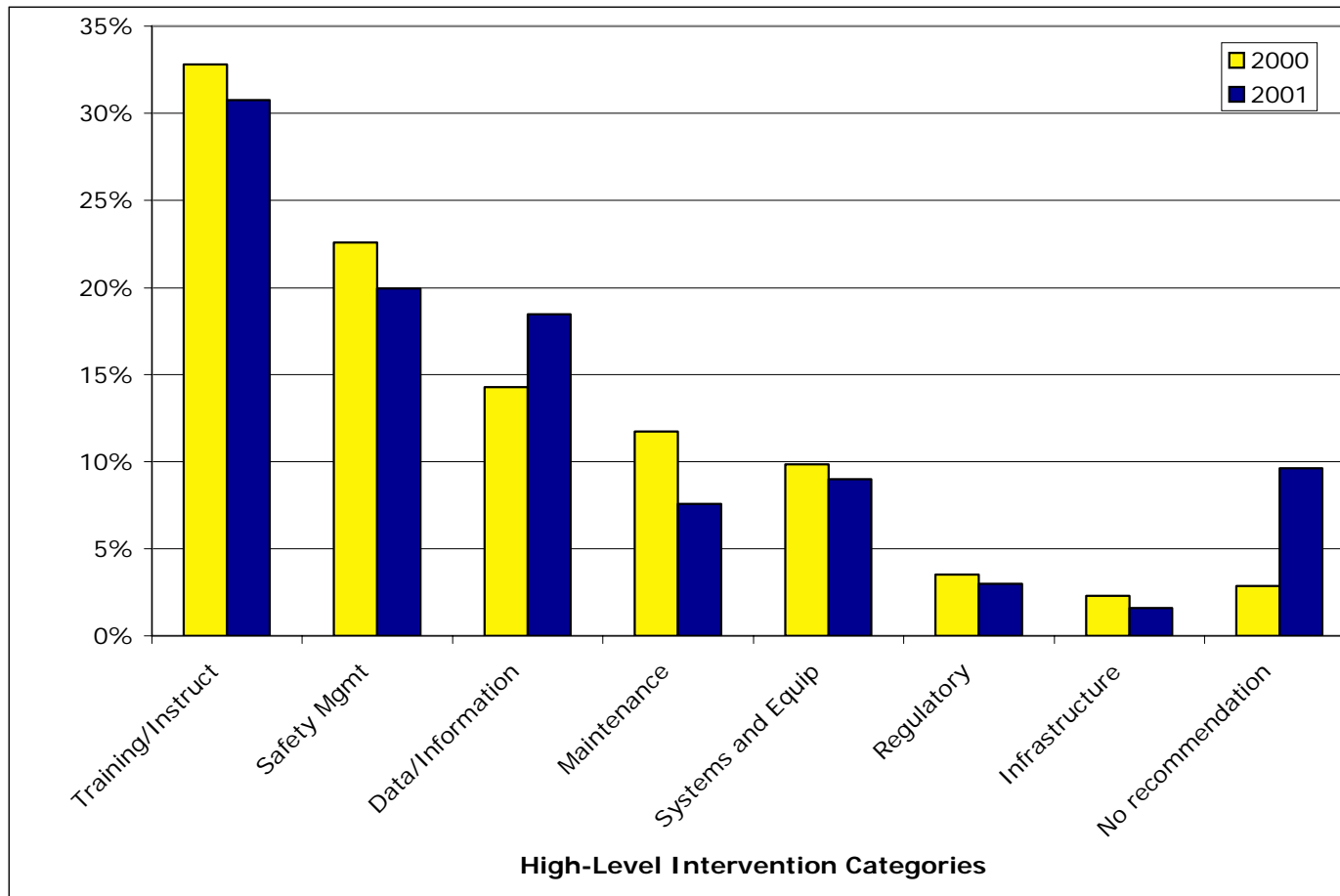
Injury Level



Comparison to CY2000 Standard Problem Statements



Comparison to CY2000 Intervention Categories



Top 20 IR List from CY2001 (abbreviated)

- D2010 - Install Cockpit Recording Devices, 98
- D010 - Improve Quality and Depth of NTSB Investigation and Reporting, 81
- T2010 - Autorotation Training Program, 30
- S8050 - Personal Risk Management Program, 27
- M3010 - Follow Instructions for Continued Airworthiness (ICA) Procedures with Confirmation of Compliance, 19
- T2060 - Simulator Training – Advanced Maneuvers, 19
- T3030 - Certified Flight Instructor (CFI) Judgment and Decision Making Training to Follow Students More Closely, 18
- T1050 - In-flight Power/Energy Management Training, 17
- T6019 - Training Emphasis for Maintaining Awareness of Cues Critical to Safe Flight, 17
- T2040 - Dynamic Rollover Training, 14
- S9010 - Establish Risk Assessment Program to Eliminate Culture of Non-Compliance, 14
- S1030 - Improved Supervisory and Operational Oversight, 13
- T6007 - Flight Training on Common Operational Pilot Errors, 12
- S7020 - Establish Oversight to Ensure Compliance with Published Procedures in Approved Flight Manual (AFM), 12
- M1010 - Better Maintenance/Quality Assurance Oversight to Ensure Adherence to the Instructions for Continued Airworthiness (ICA) and the Maintenance Manual, 12
- T1020 - Enhanced Aircraft Performance & Limitations Training, 11
- M1030 - Improve Preflight and/or Maintenance inspections, 11
- T3070 - Increase Certified Flight Instructor (CFI) Training on Cues for Low RPM, Airspeed Issues, 11
- S8020 - Use Operational Risk Management Program (In-flight), 11
- T6014 - Pilot Judgment Training Risk Assessment, 11

Appendix D - Occurrence Types Vs Mission

	Aerial Application	Aerial Observation/Patrol	Air Tour	Business	Commercial	Electronic News Gathering	Emergency Medical Services	External Load	Firefighting	Instructional/Training	Law Enforcement	Logging	Offshore	Personal/Private	Utilities Patrol/Construction	Total
Accidents	18	6	9	10	14	2	14	4	6	29	10	4	7	38	3	174
ARDM-F	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
ARDM-M	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	3
ARDM-P	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
AMAN	0	0	1	1	0	0	0	0	0	3	0	0	1	2	0	8
ARC	1	1	0	1	2	1	0	0	0	9	3	0	0	4	0	22
AUTO-E	4	1	3	2	2	0	4	2	2	4	4	2	2	8	1	41
AUTO-P	0	0	0	0	0	0	0	0	0	14	2	0	0	2	0	18
CFIT	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
DITCH	0	0	0	1	1	0	0	0	0	0	0	0	4	0	0	6
EXTL	0	0	0	0	0	0	0	1	2	0	0	3	0	0	2	8
F-NI	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	4
F-POST	0	0	1	0	1	0	1	0	1	2	0	0	0	2	0	8
FUEL	1	1	0	0	1	0	3	1	0	0	1	0	1	5	0	14
ICE	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
LOC-DR	1	1	1	0	1	0	1	0	0	3	0	0	0	3	1	12
LOC-EP	1	0	1	0	1	0	1	0	1	0	1	1	0	3	0	10
LOC-GR	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	2
LOC-INT	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	4
LOC-LTE	1	0	0	2	1	0	0	1	0	0	1	0	1	1	0	8
LOC-OL	2	1	1	0	1	0	1	1	1	0	1	0	1	1	0	11

Preliminary CY2006 Analysis

- 152 Accidents in data set (down from 174 and 197 in '01 and '00)
 - 132 completed (87%)
- Initial analysis quite similar to CY00 and CY01
 - Mission Categories with highest number of accidents:
 - Personal/Private, Training, *Aerial Observation vice Aerial Application*
- Top 3
 - Occurrence Categories:
 - Loss of Control, Autorotation, System/Component Failure
 - Standard Problem Statements:
 - Pilot Judgment and Action, Data Issues, Safety Management
 - Interventions Recommendations:
 - Training, Data Issues, Safety Management

Preliminary CY2006 Analysis

- NTSB report quality
 - Data collection reports (CA) - probable cause determination based on operator reports (no investigation)
 - 31% of CY2006 are CA Reports
 - Probable cause determination does not lead to accident prevention – need the root cause
- Compiling recommendations for investigators



Photo

Conclusion

- Raw count of accidents are down.
- Analysis is similar between the years.
 - Similar Problem statements by percentage
 - Similar Interventions by percentage
- Continued necessity to concentrate on training, safety management, data collection and investigation
- Integrated FDM programs have greatest potential to improve safety

Questions?