



# Risk Management 2009



# Objectives

- Discuss Wildland Fire Fatalities and Accident Trends since 1990.
- Focus on Causal Factors and trends
- Iterate recommendations for predicting and preventing future accidents. Discuss how firefighters can be trained to be more mindful of their environment and situation.
- New tools models to move towards a learning culture, just culture, resilient culture.

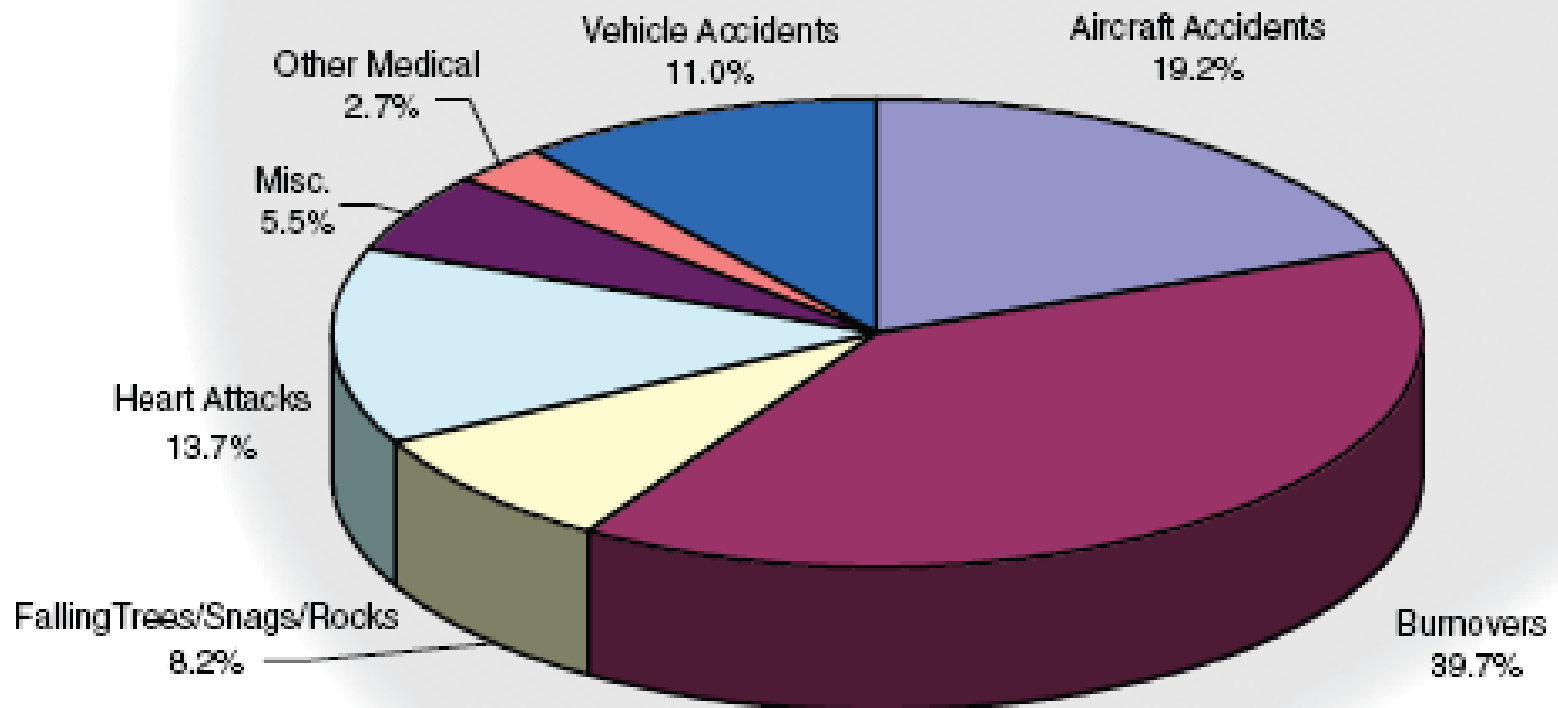
# Historic Trends

- Based on Safety Gram data - from 1990-2006:
- 306 Wildland Firefighters died during this 17 year period.
- Leading causes of death:
  - Aircraft Accidents: 72 deaths, 23%
  - Vehicle Accidents: 71 deaths, 23%
  - Heart Attacks: 68 deaths, 22%
    - 65% of these were volunteer firefighters
  - Burnovers/Entrapments: 64 deaths, 21%

# Historic Trends

- 1990-2006 Federal - 73 deaths:
- Burnovers: 39.7% - 29 fatalities
- Aircraft Accidents: 19.2% - 14 fatalities
- Heart Attacks: 13.7% - 10 fatalities
- Vehicle Accidents: 11% - 8 fatalities
- Falling Snags: 8.2% - 6 fatalities

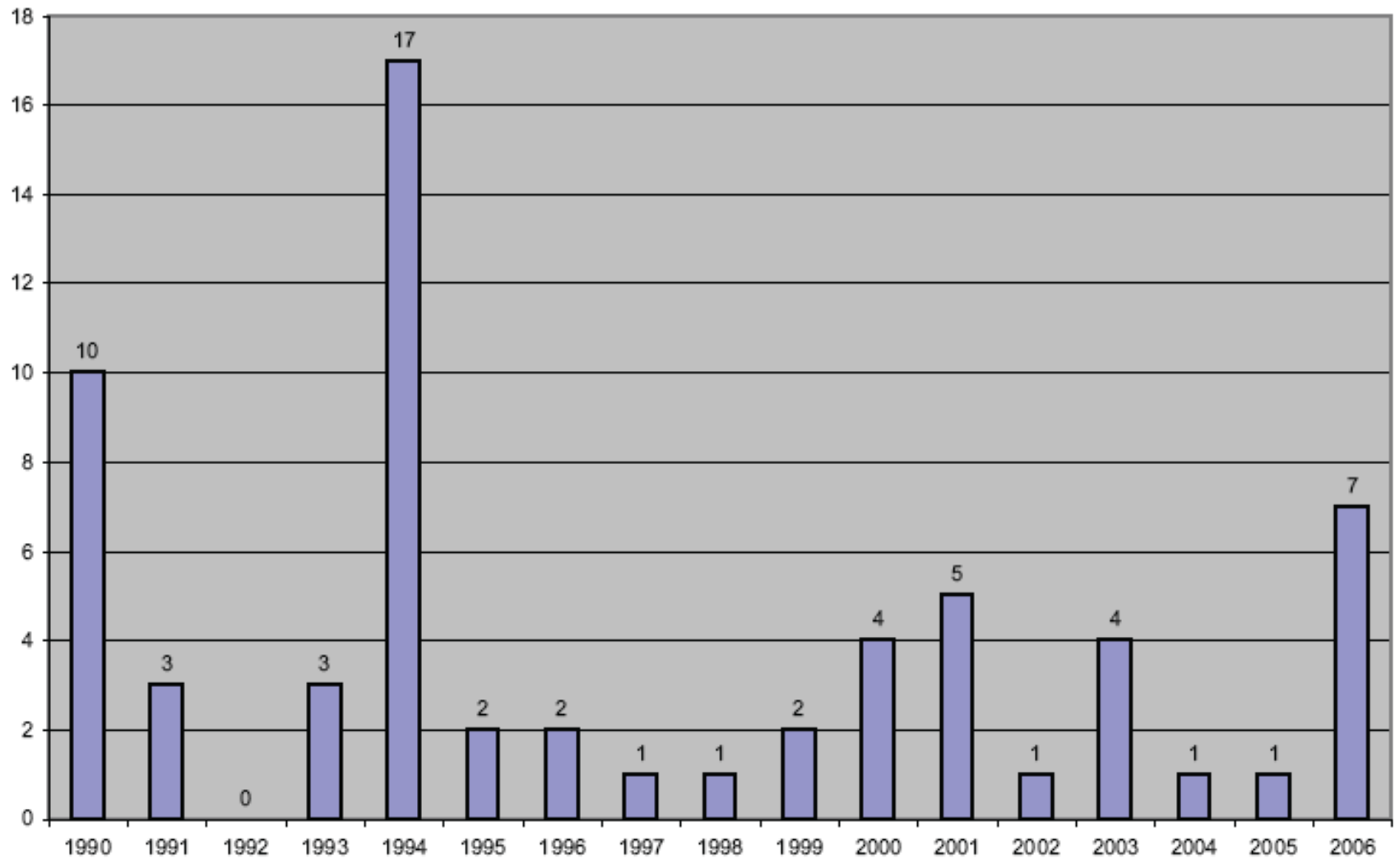
## Fatalities of Federal Employees by Cause of Death From 1990 to 2006



# Historic Trends – Conclusions

- 40% of federal fatalities were in burnovers
  - Twice the number of the next highest category, aircraft accidents
- Driving fatalities increased 1999 thru 2006  
53 fatalities verses 12 fatalities.
- Heart attacks are a lesser but still significant cause of federal firefighter deaths

### Burnover Fatalities From 1990 to 2006



**Dude Fire  
(1990)**

**South Canyon Fire  
(1994)**

**Thirtymile Fire  
(2001)**

**Esperanza Fire  
(2006)**

# Historic Trends plus 2007 and 2008

- Aircraft Accidents:  $72 + 15 = 87$ : 26%
- Vehicle Accidents:  $71 + 7 = 78$ : 23%
- Heart Attacks:  $68 + 4 = 72$ : 21%
- Burnovers:  $64 + 1 = 65$ : 19%

# 2007 Wildland Firefighter Fatalities

## All Agencies

- 9 wildland firefighter fatalities total
- Includes federal, state, municipal and volunteer fire departments
  - 3 driving
  - 2 heart attacks
  - 1 hazard tree/snag
  - 1 aviation
  - 2 "other" (dozer rollover and electrocution)
  - A keypoint is in 2007 there were 22 firefighters entrapped.

# 2008 Year in Review



# 2008 Wildland Firefighter Fatalities

## All Agencies

- 25 wildland firefighter fatalities total
- Includes federal, state, municipal and volunteer fire departments
  - 14 aviation
  - 4 "other" (hit by vehicle, fall from height)
  - 3 medical
  - 2 driving
  - 1 hazard tree/snag
  - 1 entrapment

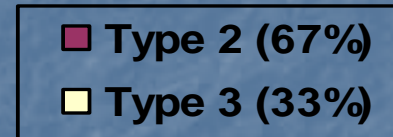
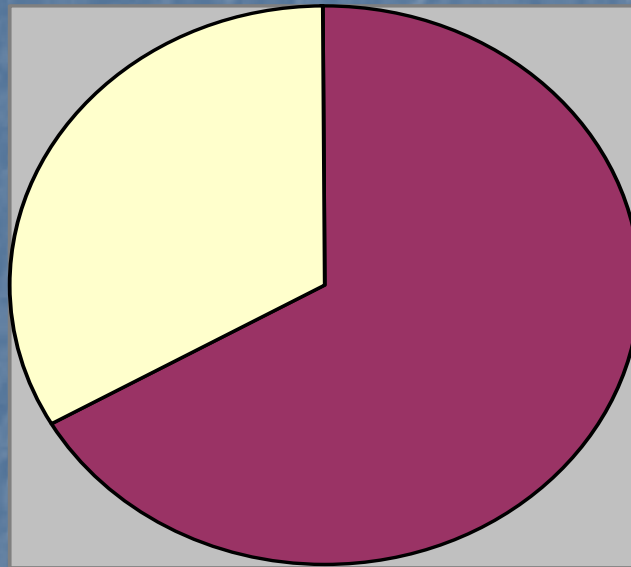
# 2008 Forest Service ground events

- 3 ground fatalities on Forest Service jurisdiction
  - 1 entrapment – local government firefighter
  - 1 hazard tree – NPS firefighter
  - 1 “other” (fall from vehicle) -- contractor
- Total entrapped firefighters: 6
  - 4 fire shelters deployed
  - 1 fatality (inside shelter)
  - Total people entrapped in 2007 on FS jurisdiction: 22
- No heart attacks

# Forest Service Entrapments 2008

- Where did these entrapments occur?
  - None were in the urban interface
  - All were in California
- What level of incident management was in place when the entrapments occurred?
  - 33% on Type 3 fire transitioning to Type 2
  - 67% on Type 2 fire

# Level of Incident Management 2008 Forest Service Entrapments



# Forest Service Entrapments 2008

- Who Became Entrapped
  - For the second year in a row, Engine personnel became entrapped the most, followed by Overhead

# Entrapment Comparison Table 2007-2008

Type of Resource	Number of People 2007	Number of events 2007	Number of People 2008	Number of events 2008	Percentage of Total People Entrapped 2007	Percentage of People Entrapped 2008
Engine Crew Personnel	11	3	4	2	50%	66%
Overhead	4	3	2	1	18%	33%
Hotshot Crew Personnel	3	1			14%	
Private Citizens	2	1			9%	
Dozer Operator	1	1			4.5%	
Contractor	1	1			4.5%	

# Calendar year 2009, through April 01, there have been four (4) fatalities.

- Driving – 1: Two trucks collided head-on due to dense smoke.
- Medical Emergencies – 3: Three fatalities when firefighters collapsed and stopped breathing, apparent heart attacks.

# Recommendations

- Focus firefighters on operational risk assessment. Need to take a total operational risk management view. Using Safety Management Systems process become predictive instead of reactive
  - But don't develop more checklists
- Maintain emphasis on entrapment avoidance
  - Use case studies and STEX
  - AARs, FLAs, APAs, Lessons Learned Reviews
- Effectively mitigate hazard tree exposure and tree felling hazards

# Recommendations

- Keep focus on reducing driving exposure
- Emphasize use of seat belts
- Emphasize proper use of PPE
- Maintain fitness programs and health screening
  - Firefit
  - Total body and mind fitness

# The Importance of the “Near Miss”

- Why should we pay attention to “near miss” events?
- Which occurs more the more serious major injuries and accidents or less serious events.
- What are the best ways to learn from unintended outcomes?

# Accident Pyramid

H.W. Heinrich - 1931

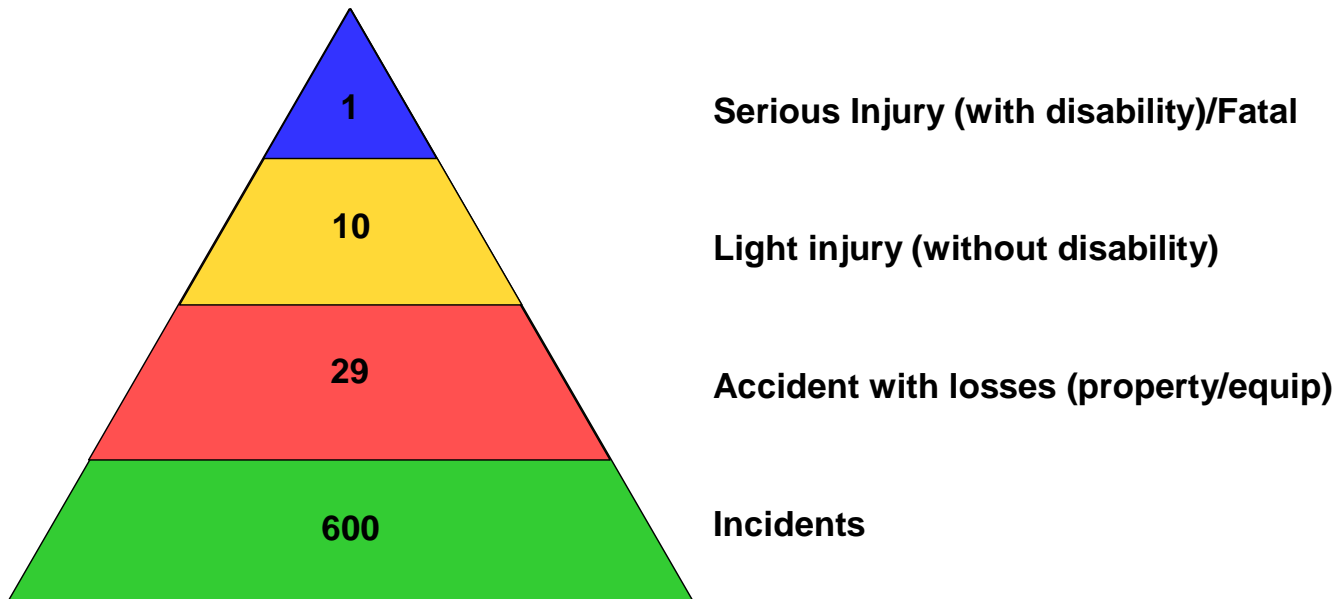


Figure 3. Pyramid of Bird. Source: Geller (1998)

# Human Error

- It has been estimated that 70-80%, up to 90% of all accidents involve some form of human error
- “Human error is a consequence not a cause. Errors are shaped by upstream workplace and organizational factors..... Only by understanding the context of the error can we hope to limit its reoccurrence”.

James Reason

# The New Paradigm

- Risk is everywhere & in everything
- We expect our employees to manage the trade offs between safety and other organizational goals continuously - sometimes logically, sometimes pragmatically, but mostly intuitively.

# Learning From Accidents

- Paradigm shift →
- Understand that accidents, near misses, close calls, incidents with potential are warnings and the organization is not correctly understanding these risk or correctly managing employee reliability... or both.
- Major accidents are a major warning

# There is Change in the Air.

- Doctrine – principles – judgment - accountability
- Lessons Learned Analysis – human factors, understanding at risk behavior, active and latent factors.
- High Reliability Organizing – high performance – “Karl Weick, Kathleen Sutcliff”
- Safety Culture –Just Culture, Open Reporting, Flexible Culture, Continuous Learning “James Reason”
- Practical drift and normalization of deviance “Diane Vaughn”
- Privilege – if the agencies, organizations were true to a safety culture and subcultures, may not need privilege.

# Near Misses in an HRO

- “Sensitivity to operations”
- All High Reliability Organizations:
  - Understand that small things that go wrong are often early warning signals of deepening trouble
  - Treat near misses and errors as information about the health of their systems and try to learn from them
  - Understand that if you catch problems before they grow bigger, you have more possible ways to deal with them

# Current Thinking

- *Managing the Unexpected – Resilient Performance in an Age of Uncertainty*
  - Karl Weick and Kathleen Sutcliffe
  - High Reliability Organizing (HRO)
- *Managing the Risks of Organizational Accidents*
  - Dr. James Reason
  - “Swiss Cheese Model”
  - Components of a ‘Safety Culture’ – Informed, Just, Learning, reporting and Resilient/Flexible Cultures.

# Current Thinking

- *The Field Guide to Human Error Investigations*
  - Sidney Dekker
  - Old view vs. new view of Human Error

# Traditional Approach Investigating Accidents

- Focus on outcome (causes)
- Unsafe acts by operational personnel
- Attach blame for failures to “perform safety”
- Address identified safety concerns exclusively: What, Who, When.
- But not always discloses: Why and How.

# What is "Accountability"

- Is it the same thing as "punishment"? Old paradigm is don't bend them don't break them. Find the causal and contributing factors, 90% of the time human error was the causal factor, and that is the end of the investigation. This has inhibited and constrained people from openly reporting.
- What types of things should people be punished for?
- What does punishment accomplish?
  - "Punishing is about stifling the flow of safety-related information (because people do not want to get caught)" -- Dekker

# Learning and punishment don't mix

- "A system cannot learn from failure and punish supposedly responsible individuals or groups at the same time." --Sidney Dekker

# True Safety Lies in Learning

- Learning is about seeing failure as part of a system.
- Learning is about countermeasures that remove error-producing conditions so there won't be a next time.
- Learning is about increasing the flow of safety-related information.
- Learning is about...the continuous improvement that comes from firmly integrating the terrible event in what the system knows about itself.

# A New Lens

- **Are your employee's values aligned with yours? With the Agency's?**
- **Are your employee's perceiving risk accurately?**

# People Create Safety

- Safety is never the only goal in systems that people operate.
- Trade-offs between safety and other goals often have to be made under uncertainty and ambiguity.
- Systems are not basically safe. People in them have to create safety by...adapting under pressure and acting under uncertainty.

Sidney Dekker

# New learning tools

- The focus of APAs, FLAs, LLRs is not to document where employees went wrong, but to understand and display why what they did made sense to them at that time. This is sensemaking.
- In an effective learning culture, mistakes, near misses and accidents are opportunities to learn.

# New Tools for Learning

- APA – Accident Prevention Analysis
  - More formal, requires full team
  - Carries assurance that no administrative actions will be taken if there was no “reckless behavior”
  - Written report produced that tells a story
  - Includes recommendations
- FLA – Facilitated Learning Analysis
  - Less formal, may be a 3-person team
  - Written report may be produced
  - Sand Table Exercise often used to replicate the accident environment
  - May or may not include recommendations

# SAFENET

- **What SAFENET IS:**

- An anonymous reporting system where firefighters can voice safety and health concerns.
- Documents corrective actions taken at the field level or provides suggested corrective actions for higher level of action.

- **What SAFENET is NOT:**

- A forum for personal attacks/defamation.
- A mechanism to elevate "pet peeves".
- Only used for incidents that need higher level corrective action.
- Interagency criteria established for posting determination – clearly stated safety and health issue necessary for posting.

# What SAFENET tells us

- FS = 48% of SAFENET submissions
- Largest category = Communications
  - Communications equipment issues primarily
- Managers unaware of safety issue 89% of the time prior to SAFENET submission

# Questions



# Near Miss Reporting

- National submissions since 2005:
- 2005 -- 180 submissions
- 2006 -- 155 submissions
- 2007 -- 119 submissions
- 2008 – 145 submissions
  
- Every report matters!!!

# SAFENET examples

- Not familiarizing new crews with escape routes and safety zones during briefing
- Conducting a burnout operation while unaware of location of other resources
- Crews driving trucks over posted speed limit or tailgating each other at high speed
- Ordering firefighters to suppress a fire during a thunderstorm

# Other Emphasis Areas

- Foundational Doctrine
- Work Capacity Testing and Health Screening
- Medical Standards Program
- Incident Medical issues
  - Medical Unit protocols & procedures
  - Standard of care/Standard of practice
  - Burn Injury Protocols

# Accountability

- Accountability should be based on a well defined distinction between acceptable and unacceptable behavior
- The determining factor is not the act, but the intent of the actor
- Evaluation based upon understanding of intent, application of principles, and judgment