

# NATIONAL SNAG HAZARD REPORT

## INTRODUCTION

Falling snags and green trees kill and injure more wildland firefighters each year. Nineteen have been killed since 1959, fifteen of those since 1985. The seriousness of this situation, in combination with changes in work force diversity and the increasing complexity of fire suppression goals suggest that we are in a new era of cooperation rather than technological advances.

In the spring of 1993, the Safety and Health Working Team (SHWT) formed a special, ten-person, ad hoc task group to review and analyze snag accidents and fatalities and make recommendations. The National Snag Hazard Review Task Group (Task Group) is comprised of representatives from firefighters, crew boss, and national fire management levels. It also includes a Behavioral Scientist from the University of Montana. The chairman of the group is Jerry Schmidt, Forest Supervisor of the Routt and Medicine Bow National Forests. A complete list of the group members appears in Appendix a, p. A-1.

During the initial review of fire suppression history (in particular, accidents and fatalities), the Task Group identified several areas of concern. A preliminary report listing the topics of concern was sent to the National Wildfire Coordinating Group (NWCG) and all cooperating agencies last summer. The document is the Task Group's final report. It contains a number of proposals and actions that should be taken to reverse the trend we are experiencing with snag and hazard tree accidents incurred during wildfire and prescribed burning activities. I recommend that you review this information, and that we adopt the actions and proposals outlined here.

The information in this report resulted from the Task Group's review of 14 fatal and/or debilitating snag accidents, which have occurred during the past six years. In addition, the group interviewed a cross-section of 100 fire suppression personnel about the safety standards, guidelines, training, and tactics currently in use. The Task Group has drawn conclusions and proposed actions to be taken to improve firefighter safety relative to snag hazards. The proposals focus on two areas: snag hazard awareness and fire crew/team cohesion.

## FINDINGS

The Task Group extracted the following facts and professional perceptions from accident investigations, from numerous interviews with experienced leaders in fire suppression, and from discussions with Dr. Jon Driessen, Department of Sociology, University of Montana, Missoula:

There is a lack of hazard awareness at all levels in fire management.

More "snag hazard intelligence" is needed (i.e.: burn-through time by species and size class; the effect of slope, weather, and tree species on snag occurrences; etc.).

Management policies for snag retention, economic/safety trade offs, and strategy/tactical alternatives need to be clearly communicated and understood.

Fire crew capabilities are overrated at both crew and overhead levels. At the crew level the crew boss often does not fully understand the level of cohesion, communication, alertness, and outdoor intuition among crew members and manage accordingly. At the overhead level, the Strike Team Leader or other crew supervisors in Operations often do not realistically evaluate crew capabilities when deploying fire crews.

There is a tendency for firefighters to become desensitized to hazards. Fatigue, boredom, and familiarity with an area can result in a fatal lack of attention to surrounding hazards.

Many of the basic rules and principles covered in training are not being applied during fire suppression maneuvers.

## **PROPOSALS AND ACTIONS**

“Continuing Improvement Processes” and “Total Quality Management” concepts have been used to facilitate the learning process in fire management and suppression for years. They should continue to be used in conjunction with the actions, initiatives, and hazard awareness systems currently in use in various agencies across the country.

The Task Group developed the following proposals and actions designed to improve fire management at all levels and to focus attention on snag and tree hazards:

**PROPOSALS FOR STRENGTHENING AWARENESS IN THE FIELD**

**PROPOSALS FOR ADDITIONAL TRAINING TO STRENGTHEN  
AWARENESS AND SAFETY**

**PUBLICATION OF AN AWARENESS FLYER FOR IMMEDIATE IMPACT**

**REQUEST FOR INCREASED RESEARCH EMPHASIS ON SNAG AND  
TREE HAZARDS AND ONGOING STUDIES OF CREW DYNAMICS**

**PRODUCTION OF AN INTER-AGENCY VIDEO FOCUSING ON SNAG  
AWARENESS AND SAFETY**

The five proposals/actions are discussed in greater detail in the following sections. Four of the proposals include extensive lists of recommendations or information. These are listed in Appendices B-E.

### **I. PROPOSALS FOR STRENGTHENING AWARENESS IN THE FIELD**

Many crew members and supervisors lack necessary awareness and understanding in two critical areas: crew dynamics and snag hazards. The extent of communication, teamwork, and outdoor acumen within crews is overestimated; hazards are often underestimated. Individuals involved in fire suppression need to have a stronger awareness of snag hazards and a realistic sense of a crew's ability to function as a team.

The Task Group is recommending a very visual campaign to address snag hazard awareness, as well as advocating additions to the existing fire suppression literature. Numerous actions and effort are being employed locally, by all agencies, to ensure awareness of snag hazards. Building on some of these, the committee recommends the following actions to increase awareness:

CHOOSE A SLOGAN (this could be done with a national contest):

SNAGS –Stop, Notice, and Go Safely

SNAG SMART – GET SOME

LOOK UP AND LIVE

ENCOURAGE LOCAL EFFORTS to develop snag hazard awareness projects. Institutionalize successful efforts.

CREATE POSTERS. One poster will feature the chosen slogan. The other poster, as part of the NWCG educational series, will focus on SNAG INTELLIGENCE. It will depict various tree species and list the species characteristics and associated disease/infestation indicators that point to the presence of snags.

PRODUCE “SNAG AREA” – SIGNS to be posted by Safety Officers and others at appropriate spots on fires. The signs will be distributed to all fire caches and included in Safety Officer cache lists.

INCLUDE A 19<sup>TH</sup> SITUATION THAT SHOUTS “WATCH OUT” – Snag and hazard trees are present.

PUBLISH A SNAG HAZARD BOOKLET (pocket size for field use) containing the snag hazard slogan, standard firefighting orders, snag mitigation measures, and the 18 or 19 Situations That Shout “Watch Out”.

ADD A LIST OF SNAG INDICATORS AND SNAG MITIGATION MEASURES to be used on shift plans and in the field for hazards that are not immediately apparent.

## II. PROPOSALS FOR ADDITIONAL TRAINING TO STRENGTHEN AWARENESS AND SAFETY

These proposals are designed to increase the emphasis on snag hazards at every level of fire training, from basic firefighting to fire supervision and management. The proposals

also focus on recognizing and improving teamwork skills within the fire crews. Basic and intermediate fire training courses need to emphasize situations that affect supervision and crew performance: crew diversity and complexity, varying levels of outdoor expertise among crew members, and the disparity between the time required to develop solid teamwork and the time available for training and the development of crew synergy. Fire suppression training at basic and managerial levels should emphasize the dynamics of working with heterogeneous crews and overhead teams assembled from interagency representatives. The three courses to be targeted are S-130/S-190 Introduction to Firefighting/Basic Fire Behavior, S-201 Fire Supervision (SRIC), and S-301 Dynamic Unit Leadership (Div. Sup). There are also Specific proposals for Fire Suppression Tactics training to replace S-336, which is being phased out. Specific recommendations for each course are listed in Appendix C.

### III. PUBLICATION OF THE AWARENESS FLYER FOR IMMEDIATE IMPACT

Modification to the fire suppression literature and training schedules will take time. An approach that can, and is, being implemented immediately is the publication of the Awareness Flyer. It includes six rules to remember emphasizing communication skills, snag intelligence, standard firefighting orders, etc. It also lists snag related fatalities from 1986 to 1992 (see Appendix D for the complete flyer).

### IV. REQUEST FOR INCREASED RESEARCH EMPHASIS ON SNAG AND TREE HAZARDS AND ONGOING STUDIES OF CREW DYNAMICS

These two proposals focus research attention on snag and tree hazards and crew dynamics. The purpose of Proposal #1 is to expand knowledge and snag intelligence, to improve risk assessment and recommendation, and to recognize all fire suppression options while continuing current policies for snag maintenance and retention.

Proposal #2 focuses on crew dynamics. The proposal advocates studying and monitoring the techniques used by cohesive crews as they encounter and deal with snag and tree hazards.

#### Research Proposal #1

##### A. Situation:

Falling snags and Hazard trees are the second leading cause of fatalities and serious injury during wildland firefighting operations. Fourteen fatalities and/or debilitating accidents have occurred on wildfires in the United States during the past six years. Countless close calls go unreported. Most accidents occur when firefighters and fire managers do not recognize potentially dangerous situations. Fire managers do not have any decision aids to evaluate the hazard associated with firefighter assignment in specific stands and under specific environmental conditions.

## B. Objectives:

Snag and tree hazard research efforts need to focus on the environmental and wildfire factors and the wood properties that contribute to the creation of snags. Research results would be used to develop a risk assessment guide for incident managers to enable them to make informed decisions when staffing fires or portions of fires. The research would also provide firefighters and line supervisors with a guide for identifying specific stand conditions that are highly correlated to the presence of snags and hazard trees.

## C. Scope:

The snag and tree hazard research project would consider all timber stand conditions during wildfire situations. The products developed (a risk assessment guide, snag intelligence information, etc.) would be beneficial to all agencies involved in wildfire suppression activities. Although the primary focus is wildfire operations, managers of prescribed fires could utilize the information in project planning.

## D. Discussion:

Incident Managers would have numerous uses for a risk assessment guide. The guide could be utilized at the onset of the incident to evaluate snag safety for each strategy being considered. This might alleviate the selection and implementation of dangerous suppression alternatives. The Guide would also serve as a supplement to the proposed snag hazard alert checklist. The guide should require only variables that are easily gathered or assessed by firefighting personnel. In addition, the snags could easily be incorporated into firefighter training or developed into a supplement to the fireline handbook. Firefighters would then be able to assess onsite conditions and adjust fireline locations to provide a safe work environment.

## Research Proposal #2

### A. Situation:

The structure of fire crews and overhead teams has changed significantly in the past several years. In the past, crews and teams were fairly homogeneous and consisted of representatives for within on agency. Today, crews and teams are extremely diverse and are comprised of representatives from a broad spectrum of agencies. Generally, the available training time does not allow these diverse crews to develop a high degree of communication and cohesiveness. As a result, crew and team capabilities are often overestimated and misunderstandings are common. Driessen has found an inverse correlation between crew cohesiveness and accident rates in fire crews.

### B. Objectives:

Studies need to be initiated and continued to define and monitor the methods used by cohesive crews when coping with snags and other hazardous situations. This information

then needs to be disseminated to leaders and members of newly organized crews, and included into supervisory training courses. Recommendations should also focus on methods for decreasing the time necessary to achieve crew cohesiveness.

#### C. Scope:

Duties of crew dynamics would consider the social and institutional diversity and levels of outdoor experience and common sense encountered during fire suppression operations, as well as the time requirements for the development of cohesive crews. The results should be disseminated to all levels during pre-fire training and, where applicable, in fire operation briefings.

#### D. Discussion:

All people being trained for or involved in fire suppression would benefit from the study of cohesive crew interaction, crew coordination techniques, and the methodology used by cohesive crews and teams when coping with snag and tree hazards. Fire organizations, at all levels, would benefit from increased awareness and improved communications skills. Video portrayals, classroom presentations and role reversal techniques could be used to teach these concepts.

### V. PRODUCTION OF AN INNER AGENCY VIDEO PROMOTING SNAG AWARENESS AND SAFETY

The production of this video is currently underway. It is intended to strengthen awareness, intuition, and discipline. After viewing this video, the audience will understand and appreciate the safety hazard posed by snags and be able to recognize the conditions under which snags are likely to occur. In addition, the audience will be able to list appropriate ways to identify, evaluate, and eliminate snag hazards after viewing the video (see Appendix E for a detailed description of the video schedule).

#### **Appendix A – MEMBERS OF THE NATIONAL SNAG HAZARD REVIEW TASK GROUP**

Jerry Schmidt, Forest Supervisor, Routt and Medicine Bow National Forests  
Dave Dallison, Resource Staff Officer, Routt National Forest, Yampa District  
Tom Zimmerman, Fire and Training Staff Group, NPS, Washington Office  
Jon Driessen, Professor of Sociology, University of Montana, Missoula & MTDC  
Kelly Esterbrook, IHC Foreman and Smokejumper, Dechutes National Forest  
Buck Latapie, Group Leader for Fire Training and Safety, Forest SeNice, R6  
Don Black, Fire Management Officer, Boise National Forest, Cascade District  
Mary Kwart, Fuels Specialist, Sierra National Forest, Minarets District  
Jerry Jefferies, Fire and Safety Group member, Forest Service, R1  
Dave Aldrich, Leader for Fire Safety and Training, Forest Service, Washington Office

## **APPENDIX B – LIST OF RECOMMENDED ADDITIONS TO THE FIRELINE HANDBOOK**

### Indicators of Hazard trees/Hazard tree Zones

Fire burning in the base or top of a dead or live tree that may indicate the presence of rot, which results in a weakened tree

Tree species present in the work area that is susceptible to heart rot (such as fire), root rot, and shallow roots.

The presence of conks, broken tops, basal scars, cat faces, numerous down limbs, etc. that may indicate rot.

Trees with significant lean.

Numerous down trees and/or stump holes burning in an area that may indicate a pocket of trees with root rot.

### Snag Hazard Mitigation Measures

Scout for hazard trees and post warning signs.

Post lookouts in areas of known or potential snag hazards.

Communicate presence of snag hazards and tactics for removal/avoidance to each crew member.

Make each crew member responsible for speaking out and adjusting tactics whom confronted by hazards.

Use snag intelligence when evaluating a fire and developing tactics.

Employ tactics to avoid snag hazards or minimize exposure to snags.

Plan and discuss multiple escape routes and safety zones, considering vegetation and terrain.

Use field training to brief personnel on the visible indicators of snag hazards.

Choose rest locations where exposure to snag hazards is minimized, such as open areas or rock outcroppings.

When escaping the path on a falling tree, watch the tree while moving out of the way. Be aware of any deviation in its fall or roll caused by contact, breakage, etc.

## **APPENDIX C – SUGGESTIONS FOR A SNAG HAZARD ALERT CHECKLIST**

Snags are falling or have fallen in work areas.

Hazard tree indicators are present in work areas.

High-risk tree species are present in work areas.

Crews are working in a hazard tree area at night.

Crews are working in a hazard tree area, and the wind is blowing.

Crews are working in an area where trees have been burning for some time.

The operational period or functional briefing did not include a discussion of hazards.

Crew members are taking a break in a hazard tree area.

Lookouts have not been posted in a hazard tree area.

Winds are increasing or are predicted to increase.

Tree height within fire perimeter equals or exceeds distance to control line.

Escape routes pass through hazard tree area.

## **APPENDIX D – SUGGESTED COURSE INCLUSIONS FOR S-130/S190 INTRODUCTION TO FIREFIGHTING/BASIC FIRE BEHAVIOR**

Establish a snag hazard awareness protocol for the crew to follow during incidents. The protocol should include the following steps:

Identify the snag hazard.

Avoid the hazard.

Communicate with the supervisor (squad boss or crew boss) and crew members about the hazard. Express safety concerns.

Mitigate the hazard with steps agreed to by supervisor. This would include flagging the hazard, posting a lookout, choosing to work away from hazard, planning escape routes, etc.

Have crew members yell “snag!” – or “snag Patch!” – as they walk by snags on line, just as they do for “rock!” or “Watch you footing”.

Have crew members report close encounters with snags. If it is important, it is worth repeating.

Show the Snag Hazard Awareness video.

Change the Instructor's script in the basic firefighter training manuals:

Incorporate snag hazard awareness into discussions of 10 standard firefighting orders. In particular, elaborate on the order to establish lookouts. Include snag and tree hazard examples, as well as the usual fire behavior examples.

Incorporate snag hazard awareness into discussions of the 18 Watch Out Situations, particularly in the following situation:

#2. Crew members are working in an area they have not seen in daylight.

#3 Safety zones and escape routes have not been identified.

#5. Crew members have not been informed about strategy, tactics, and hazards.

#7. There is no means of communications between crew members and/or supervisors.

Provide blank lines on the back of the 18 or 19 situations that shout watch out cards for incident specific Watch Out Situations.

Develop a booklet modeled after "Common Denominators of Fatality Fires" to be distributed at S-130/S-190. The booklet will contain common denominators of snag fatalities and near misses distilled from the snag accident reports.

#### APPENDIX D – SUGGESTED COURSE INCLUSIONS FOR S-201 FIRE SUPERVISION (SRIC)

Reduce the time necessary to establish crew cohesion by using team-building exercises, videos, and games and by having crew shirts and hats.

Have supervisors de-emphasize harmful attitudes that may lead to unsafe situations. Give all crew members permission to express their concerns about safety without fear of ridicule or reprisal.

Emphasize the dangers of complacency as well as over confidence. Incorporate snag hazard issues in routine job hazard analysis, if applicable.

Use the buddy system (experienced crew members paired with inexperienced members) to enhance crew cohesion.

Make safety a primary concern during every aspect of fire management and suppression.

Recognize that crew heterogeneity (diverse background, experience, and perspectives) necessitates a more complex; flexible supervisory approach.

Recognize that misconceptions and lack of experience can occur at any level in fire management. Emphasize that this should not undermine confidence in leadership.

Develop and disperse personal descriptions of accidental deaths/injuries. Do a case study experience from a supervision standpoint.

Emphasize that it is acceptable to question the planned or communicated use of unsafe tactics and to suggest alternatives.

Maintain communications about snag hazards with overhead as well as crews.

Assign an accountable, snag hazard awareness person on each crew. During breaks and down time, discuss the snag hazards already encountered.

Discussion potential snag hazards at crew briefings. The crew supervisor should request relevant local information (tree characteristics, presence of disease/infestation, etc.) during briefings with the Strike Team Leader.

Continuously monitor the presence of environmental hazards (including snags) and fire behavior related to the hazards. Convey this information to crew members during fire suppression maneuvers.

## APPENDIX D – SUGGESTED COURSE INCLUSIONS FOR S-301 DYNAMIC UNIT LEADERSHIP (DIV/SUP)

Develop tactics that limit the amount of time ground forces spend in snag “danger zones.”

Realistically estimate the increased costs associated with utilizing tactics to avoid snag hazard areas.

Have Fire Behavior Officers develop a site-specific, snag hazard analysis based on fuel types, slope, aspect, and predicted fire behavior. For example, a fast moving grass fire on predominately northern slopes (higher fuel moisture content) with sparse timber would pose a low hazard to firefighters and would be a snag hazard “A.” Dense timber stands with heavy ladder fuels on south slopes would pose a greater hazard and be classified as a snag hazard “D.”

Have a qualified Strike Team Leader, Crew Leader, or Felling Boss evaluate burning snags that can’t be felled to determine damage potential when they fall. If it appears that the snag will fall outside the established line. Firefighting resources should be prepared to pick up the slop over.

Identify snag areas in the Incident Action Plan. Include a specific message and map of the areas for firefighters in that division.

Conduct snag reconnaissance using air resources. Use the resultant information to determine snag hazard potential and line location.

Identify air attack retardant drops and helicopter bucket drops for the Planning Action and for Ground Operations.

Evaluate the Field Observer’s knowledge of snag hazards using a snag intelligence questionnaire.

Include signs or flagging with reflective lettering in the Field Observer/Line Scout package to warn crews of the presence of snags.

Restrict operations to daylight hours in areas with numerous snags.

Establish and maintain a close relationship between Operations and Safety.

## APPENDIX D- SUGGESTED COURSE INCLUSIONS FOR FIRE SUPPRESSION TACTICS

Modify course curriculum to include a snag hazard identification section focusing on indicators of hazard trees/hazard tree zones, “Watch out” situations associated with snag hazards, and mitigation measures for working in snag hazard areas. Make this required training for all single resource Incident Commanders.

Integrate the following ideas into the instructor’s guide:

Avoid creating or leaving hazardous trees and snags during/after dozer line construction.

Avoid the snag hazard resulting from air tanker retardant drops and helicopter bucket drops.

Locate the fireline outside the falling radius of the largest snag (use a distance greater than or equal to the snag height x 1.5).

Modify line location principle/techniques to avoid snag patches, which could result in larger acreage or more expensive operations. Firelines should be located a distance greater than or equal to the snag height x 2 from the snag.

Emphasize that areas with crown fires may **SOMETIMES** be safer because much of the rotten material may have been consumed initially by the intense fire. **THIS COULD BE RISKY AND SHOULD BE EVALUATED CAREFULLY.**

Consider letting natural burn-out occur in snag hazard areas, rather than deploying crews to mop-up.

Consider blasting instead of felling trees. Use qualified people.

Use Field Observers and others to do reconnaissance and identify snag hazard areas.

Have the Strike Team Leader, Crew Leader, and/or Felling Boss determine the damage potential of burning snags, which can’t be felled. The assessment should include the following:

What portion of the line will the snag fall across?

Will the snag fall outside the fireline?

What is the extent of the impacted area if the snag falls outside the line?

If a snag is likely to fall across the line, limit mop-up in the area until the snag falls.

After assessing the damage potential of the burning snag, consider the following steps:

Assign a snag lookout to monitor the burning snag during day and night shifts. The lookout will be responsible for informing all Firefighters in the area of the snag's location and potential.

Flag the danger zone; do not allow firefighters to enter the zone for any reason.

Establish alternate routes around hazard areas.

Identify snag areas in the Incident Action Plan. Include a specific message and map of the areas for the firefighters in that Division.

If it appears that snags will fall outside the established line, have personnel and resources reroute the line to secure the area.

Conduct snag reconnaissance using air resources. Use the information to determine line location and pinpoint snag hazard area to be ground-checked.

Emphasize communication from ground troops to overhead to command, including cooperators and contractors.

Remember that green trees, as well as dead and dying trees, may be a hazard.

Consider having no night shift. If a night shift is unavoidable, make certain crews are well briefed on hazards and tactics. For example, avoid snag hazard areas pinpointed during the day or make it a priority to fell hazard trees during the day.

Maintain accountability during the on-going formulation of fire tactics. Reinforce that awareness is critical at every level in fire suppression.

## APPENDIX E – THE AWARENESS FLYER

EARLY ALERT  
SNAG HAZARDS

FALLING SNAGS AND GREE TREES KILL AND INJURE MORE  
WILDLAND FIREFIGHTERS EACH YEAR  
19 HAVE BEEN KILLED SINCE 1959, 15 OF THOSE SINCE 1985!  
RULES TO REMEMBER

- 1) Help maintain snag hazard awareness at all times for all firefighters.
- 2) Emphasize 10 standard fire fighting orders, and 18 situations that shout “watch out.”
- 3) Include “SNAG INTELLIGENCE” in all fire suppression discussions and briefing. I.E. expected burn through time, location and marking, acres of snags, additional hazard due to slope, etc.
- 4) Strengthen Leadership communication skills for dealing with diverse organizations and crews.
- 5) Be aware of COMPLACENCY on fires of all sized during all phases. Particularly during non-threatening and un-eventful periods.
- 6) Direct and train all firefighters to do their own safety assessments, and encourage all to interact with their supervisors to insure better safety.

## Snag Related Incidents 1986-1992

8/18/86 A male firefighter working on the Ace Creek fire in northwest Washington was struck by a 132-foot "green" White Pine with heart rot, as his crew walked up the fireline.

7/17/87 An experienced male faller working on the 400-acre Reynolds fire was killed by a falling snag. The faller was clearing a fireline and was aware of the hazardous snags in the area.

10/11/88 A male firefighter was killed on the Clover Mist fire by a falling snag that hit him on the head while watching a helicopter bucket drop on a hot spot in burned-over Lodgepole Pine.

8/13/90 A male CDF firefighter working on a hose lay on the Recer fire was killed by a 20-30 foot falling snag. The hose lay being made to control a spot fire in medium to heavy timber understory.

8/18/91 A second year male firefighter was struck and killed by a 6" diameter falling snag while taking a rest break on the fireline at night. The two person crew was taking initial attack action of the 70'x70' Vaughn Lake fire, in dense spruce with the presence of heavy downfall, and standing snags. There was no wind or fire above the ground in the snag that fell.

7/30/92 A female engine crew member was killed by a falling snag while establishing a pump and hose lay at the base of the fire perimeter on the Silver Creek fire. The fire was 4-acres in heavy logging slash within a 6-acre clearcut.

8/31/92 A male firefighter with the Oregon Dept. of Forestry working on the Pryor fire was killed by a 7" diameter snag, which had been growing out of the base of a much larger Douglas Fir.

In nearly every case victims were aware of the presence of snags and had warning shouted during the event, but did not hear the warning or were unable to get out of the way in time.

APPENDIX F- SNAG AWARENESS VIDEO PLANNING, PRODUCTION, POST  
PRODUCTION PROCESSES  
PHASE-1 PRODUCTION PROCESS-PLANNING PHASE

1. Project Analysis and Determination of the Apparent Need to Used Video (by Project Team and Video Production Officer) by 11/22/93 DONE

The NWCG SHWT has determined a need based on their on-going work in developing a snag hazard awareness program. A video contributing to this purpose is also a positive requirement of the Silver Creek fatality accident investigation.

2. Audience Analysis (by Project Team) by 11/22/92 DONE

Target Audience is al active wildland firefighters, including Incident Command Teams.

3. Develop Objectives (by Project Team) by 11/22/93 DONE

4. Determine Constraints of Budget; Schedule Personnel (by Project Team and Video Production Officer) by 11/22/92 DONE

Budget:

Total Project Budget

Phase 1 – Planning	\$15,000
Phase 2 – Production	\$6,000
Phase 3 – Post-Production	\$4,000

Personnel:

Personal assignments between 11/22/93 and 2/20/94 are;

Jody Howard, Video Production Specialist

(funded, by project): as needed

Frank Carroll, Video Production Officer

(funded by home unit): 6 days

Don Black, NWCG HSWT Snag Hazard Task Force Project Leader

(funded by home unit): 10 days

Steve Raddatz, Project Team

(funded by home unit): 6 days

Jack Gollaher, Project Team  
(funded by home unit): 6 days

Andi Kleinman, contractor; storyboard support  
(funded by project): 5 days

Identification of Subject Matter Experts for Review  
(by Project Team and NIFC Division of Training)  
by 1/14/94

Development of Sequence and Structure of Learning, and Storyboard  
(by Subject Matter Experts, Project Team, and Video Specialist)  
by 2/20/94

First Review of Budget and Schedule Status, Personnel Availability, and  
Storyboard, WITH APPROVALS  
(by Project Team, Video Production Officer, and NWCG-TWT)  
by 5/15/94

END PRODUCTS OF PLANNING PHASE BY 5/15/94

Target Audience Identified  
Program Objectives Identified  
Sequence and Structure of Learning Identified  
Storyboard Approved

SNAG AWARENESS VIDEO PRODUCTION  
PLANNING, PRODUCTION, POST-PRODUCTION PROCESSES

PHASE 2 PRODUCTION PROCESS – PRODUCTION PHASE

Project Assignments Made to Subject Matter Experts and Video Specialist  
(by Project Team Leader and Video Production Officer)  
by 3/31/94

Screening of Existing Visuals (by SMEs and Video Specialist) by 3/31/94

Audio Needs Identified (by Video Specialist) by 3/31/94

Narration Music, Sound Effects Chosen (by Project Team, Video Specialist,  
SMEs) by 7/29/94

Procurement of Needed Audio Components and Licenses (by Contracting Office)  
by 8/26/94

Video Shooting Plan Developed (by Video Specialist) by 3/31/94

Production Unit Video Log (by Video Specialist) 8/26/94

Graphics Needs Identified (by Video Specialist) by 7/29/94

Production Unit Narration

Production Unit Music

Production Unit Sound Effects (by Video Specialist) by 9/15/94

END PRODUCTS OF PRODUCTION PHASE BY 9/15/94

All Production Units Completed

SNAG AWARENESS VIDEO PRODUCTION  
PLANNING, PRODUCTION, POST-PRODUCTION PHASE

PHASE 3 PRODUCTION PROCESS – POST-PRODUCTION PHASE

First Draft of Production Compiled  
(by Video Editor)  
by 9/30/94

First Draft Reviewed  
(by Subject Matter Experts, Production Officer, NWCG-TWT, and Standards  
Office)  
by 11/1/94

Final Edit Completed  
(by Video Editor)  
12/1/94

Master Tape Reviewed  
(by Project Team, Standards Office, and NWCG-TWT)  
by selected meeting date, 12/94 or 1/95

Production Approved for Certification  
(by NWCG-TWT)

Production Duplicated and Distributed  
(by NWCG Publications Management System)  
3/95

END PRODUCT OF POST-PRODUCTION PHASE BY 3/95  
Video Tape is Available for National Distribution and Use Through NWCG-PMS

SNAG AWARENESS VIDEO PRODUCTION  
PLANNING, PRODUCTION, POST PRODUCTION PROCESSES

IDENTIFICATION OF RESPONSIBLE PARTIES

PROJECT TEAM:

NWCG-SHWT Snag Hazard Awareness Task Force  
Don Black; Task Force Member; Project Team Leader

Boise National Forest Public Affairs Office  
Frank Carroll; Public Affairs Officer

Boise National Forest Fire and Aviation Mangement  
Steve Raddatz; Assistant Fire Staff-Supression

VIDEO PRODUCITON OFFICER:

Frank Carroll; Public Affairs Officer, Boise NF

VIDEO PRODUCTION SPECIALIST/VIDEO EDITOR:

Jody Howard; Videographer/PAO, Boise NF

National Wildlife Coordination Group  
Received 7/27/1993

Memorandum

To: NWCG Members

From: Elmer Hurd, Chair

Subject: Snag Hazard Task Group-Initial Report

The Snag Hazard Task Group, formed by the Safety and Health Working Team and chaired by Jerry Schmidt, Forest Supervisor of the Routt National Forest, developed this "early alert" notification of useful information during their initial meeting. It is relative to snag and tree hazards encountered during wildfire and prescribed burning activities. These hazards are second only to aviation accidents when accounting for the fatality and injury rate due to fire suppression activities. I recommend that you share this information with your firefighters and other field personnel.

This information was developed by a special 10-person ad hoc task group organized to review 14 fatal and/or debilitating snag accidents, which have occurred during the past 6 years. This group included people ranging from the crew boss and firefighter levels to national management levels to a Behavioral Scientist from University of Montana. In addition, they interviewed approximately 70 to 80 people from all levels of fire suppression operations relative to their experiences and feelings about safety standards, guidelines, training and tactics currently being used. They have outlines precautions that should be taken to ensure effective firefighter safety relative to the snag hazards.

Ad hoc task group will develop specific recommendations for improving firefighter safety with regard to snag hazards, but they offer these early observations that could be implemented immediately.

**-Strengthen snag hazard awareness for all firefighters.** Many firefighters are surprisingly naïve and are not aware of all the dangers associated with the snags and damaged or infected trees in a burning or burned-over area and how un-discernable some hazards can be.

**-Emphasize 10 Standard Fire-fighting Orders and 18 Situations that Shout "Watch Out".** Discuss how some of these apply specifically to snag hazards and how firefighters would employ these when hazards have been identified. Perhaps, given the magnitude of the snag-related accident situation, there is a need to consider a 19<sup>th</sup> situation, i.e. "Feeling complacent when mopping up or working in a burned-over timber area."

Include "Snag Intelligence" (which includes information about possible green tree hazards) in all fire suppression discussions and briefings. Add snag intelligence information to all current communications such as the following:

Agency Administrator Briefing  
Escaped Fire Situation Analysis or Equivalent Documents  
Incident Action Plans  
Other Briefings such as Operational Period Briefings, crew, strike team or replacements  
Fire Behavior reports  
Safety Officer reports  
Tailgate sessions  
Job Hazard analysis  
Prescribed fire plans

\*Note: Snag intelligence should consider things like the following: occurrence and extent of snags; anticipated snag “burn-out time;” hazard added due to slope; acres of hazardous area to be avoided due to tree heights; stand structure, forest health, and snag density; additional crew strength and costs due to additional acres burned while allowing for snag hazard requirements.

Strengthen leadership skills for dealing with heterogeneous organizations and crews. We are all dealing with professionally, technically and culturally very diverse organizations. Uniform understanding of goals, objectives, standards and guidelines requires more communication and leadership effort by supervisors at all levels in the fire organization.

Be aware of complacency on fires of all sizes during all phases. Many of the most tragic accidents have occurred during what appeared to be non-threatening, uneventful situations during all phases of fire suppression operations.

Direct all firefighters and train them to be able to do their own safety assessments and encourage all to interact with their supervisors to ensure better safety. Sometimes, overhead members overestimate crew capabilities and direct people into relatively unsafe situations. Sometimes, crew foreman or individuals know this, but do it anyway to avoid falling short of expectations.

Attachment

#### SNAG HAZARD REVIEW INCIDENTS, 1986-1993 (NWCG)

On August 18, 1986, a firefighter working on the Ace Creek Fire in northeast Washington was struck by a “green” 132-foot white pine tree with heart rot as his crew walked up the fireline enroute to their assigned area. There were many snags in the area. As the tree fell, other crew-members shouted warning but the victim could not get out of the way.

On July 17, 1987, an experienced faller working on the 400-acre Reynolds Fire was killed by a falling snag. The faller was clearing fireline and was aware of the hazardous snags in the area.

On October 11, 1988, a male firefighter was killed on the Clover mist Fire by a falling snag that hit him on the head while he was watching a helicopter bucket dump on a hot spot in burned-over Lodgepole Pine. The crew had been given an assignment to mop up smokes down a ridge from a helispot. The victim was with his brother and another firefighter at what appeared to be a safe distance from the effects of helicopter down-wash. The victim and other crew members were well aware of the snag hazards.

On August 13, 1990, a male firefighter from the California Department of Forestry working on a hose-lay on the Recer Fire was killed by a falling snag. The hose-lay was being made to control a spot fire in medium to heavy understory of timber. The victim received a blow to the head that broke his helmet in several places. The snag was 20-30 feet tall. The victim had been warned about the snag's presence and heard warning from others as it was falling but could not get out of the way in time.

On September 18, 1991, a 22-year-old, second-year male firefighter was killed on the Vaughn Lake Fire by a falling snag that hit him while he was on a rest break at night. He was part of a two-person crew taking suppression action on a lightning-caused fire that was about 70-feet by 70-feet in dense spruce timber with the presence of heavy blowdown and standing snags. The snag was about 6-inches in diameter where it made contact with the firefighter across his chest breaking ribs and rupturing several internal organs. Both firefighters noticed that snags and trees had been scorched, but neither noticed any burning or weakened snags in the area. There was no wind.

On July 30, 1992, a female engine crew member was killed by a falling snag while establishing a pump and hose-lay at the base of a fire perimeter on the Silver Creek Fire. The fire was 4-acres in heavy logging slash, within a 6-acre clearcut, on a 25-65 percent slope. The rate of spread was relatively slow, with high burning intensity. Fifty-six firefighters were on the fire. The engine crew was working as a functional group unassigned to a geographic area of the fire. Personnel failed to accurately assess the threat of known snag hazards and communication links were fractured.

On August 31, 1992, a male firefighter with the Oregon Department of Forestry working in the Pryor Fire was killed by a falling snag. The firefighter was working in the fireline with a hoe, knew about the pole snag, and heard the warning about the falling snag as it fell. However, the victim turned toward the snag, apparently not knowing what direction it was coming from. All witnesses agreed that there was not enough time for the victim to avoid the accident. The snag was 7-inches wide and grew from the base of a much larger Douglas Fir.

# SAFETY ALERT

October 12, 2001

## Discussion: Tree Felling Safety

During the last couple of years there have been an alarming number of near misses and injuries related to tree felling operations in Region 6, and there was a recent fatality in Region 4. Following fundamental safety rules for tree felling operations that were established after a similar accident occurred several years ago in Region 6 could have prevented this and other incidents and near misses.

To protect all people from exposure to serious hazards during tree felling operations, the following safety procedures should be applied to all projects involving tree felling, including training and certification activities. Finally, supervisors are responsible for reminding employees of these required safe job procedures during Tailgate Safety Meeting prior to any felling operations, and enforcing them.

- A secure felling area, ***MINIMUM OF TWO AND ONE HALF (2.5) TIMES THE HEIGHT OF THE MATERIAL BEING FELLED IN ALL DIRECTIONS***, needs to be established and maintained by the faller during all tree felling operations. In addition, secure the entire downhill side on slopes where material can roll for long, unpredictable distances.
- No one shall be permitted in the secured felling area during tree felling operations.
- No one shall be permitted in the secured felling area without the authorization of the faller.
- The faller shall establish a safety zone outside the secured area, and direct EVERYONE to remain there until ALL FELLING is completed, and an “all clear” has been communicated.
- Safety zones should be established, whenever practical, in the opposite direction of the planned fall, and at a distance of at least 2.5 times the height of the trees being felled.
- The faller shall establish Lookout(s). The Lookout(s) shall have reliable communications with the faller, and the people in the safety zone to ensure no one enters the secured felling area.

- Lookouts shall be established and maintained by the faller at all major access points of roads and trails that afford access to the secured felling area. Effective communications must be established and maintained between lookouts and the faller.
- The faller will ensure that no hazards remain such as hang-ups, unstable logs, or other dangers before approving access or leaving the secured area.
- Supervisors and employees are responsible for understanding and following these basic tree felling safety rules.

USDA Forest Service R-1 Correspondence Nov. 29, 1993

Reply To : 2600/2400

Subject: Meeting with OSHA and Montana Logging Association on Snag Management

To: Forest Supervisors

Attn: Forest Wildlife Biologists/Timber Staff

Nearly all Forest Plans contain guidelines and standards for the retention of snags, downed woody material, or other elements of dead wood and decadent trees. Snags, downed woody material and decadent trees provide habitat for a wide array of birds, mammals, insects, reptiles and plants. It is an important element of habitat diversity. Monitoring of the success of implementing snag guidelines has produced limited, but discouraging results. Essentially, there is no documentation of meeting Forest plan standards for snags in any area monitored to date. This discouraging insight led to the formation of a working group to provide guidance for revision of Forest Plan standards and direction.

Concurrently, the Occupational Safety and Health Administration (OSHA) has conducted some field reviews of logging sites in Montana and has raised some concern about the safety aspects of snag retention in a logging unit.

In the interest of developing workable, implementable direction regarding snag management, a meeting was held between OSHA, the Montana Logging Association, and the Forest Service in Missoula on October 5. This memo documents the meeting and attempts to summarize the exchange of information in a tabular form:

- 1) Forest Service attendees explained the background and rationale of existing Forest Plan standards and guidelines and the evidence regarding results of monitoring. Most Forest Plans contain some specific direction for snags (Appendix 1). Limited monitoring has indicated when and how snags are lost during and after a logging operation (Appendix 2). Anecdotal evidence from most Forests supports the conclusion that results are similar to what the Lolo National Forest documented.
- 2) Next, the OSHA representatives provided a concise overview of their role. Basically, OSHA is the Federal agency responsible for the implementation of Safety Codes in the workplace. Implementation of safe logging practices is a paramount concern and OSHA investigates an average of 4 fatalities a year in Montana (15 in 1992). Medical and workmen's compensation associated with accidents related to falling snags has exceeded \$1 million in the past 3 years. Historically, OSHA

had not inspected logging crews of less than 11, so has not been very active in Montana except in investigating fatalities. Recently, they have developed a local emphasis program on logging safety that will facilitate a stepped up inspection program in Montana.

In lieu of having specific logging practice safety codes, OSHA embraces the “Rules of safe Logging” developed by the Montana Logging Association (MLA) and enforces safe working practices under their General Duty Clause. This clause allows OSHA to cite violators for working within the conditions of a recognized hazard. OSHA can cite a Federal agency for “taking away” safety option of a contractor.

OSHA identifies “unsafe snags” as a recognized hazard. The criteria for unsafe snags, though subject to much professional (logger) judgment, considers these factors – type of tree (spruce, root rot DF, SAF more unsafe than PP or larch); lean height and crown/height ration, evidence of fire and disease, wildlife use resulting in decay or weakening of the tree, density of snags and general degree of decay. They expressed that broken top snags were safer than tall spike top snags, that the less degree of lean the better, and that when sawyers had to watch more than a couple of snags at a time they were concerned.

Through an informal working relationship, OSHA and MLA work together to educate and enforce safe logging practices in the woods. Their relationship is based upon a common interest in the same problem – SAFETY.

- 3) The Montana Logging Association represents the professional loggers of Montana in many aspects of their professional welfare. They have no regulatory power but exert significant influence through their roles in training, communication and monitoring. Their influence extends to OSHA in that OSHA supports the specific safety standards the MLA has developed. MLA has produced a safety handbook in cooperation with the Department of Labor and Industry. Entitled “Rules Relating to Logging Departments and Logging Operations in Montana,” this handbook is currently out of print and is a priority for updating and reprinting by MLA. Many logging contractors in Montana have banded together and developed “self insurance” in a effort to reduce injuries, reduce workmen’s competition costs, and reduce insurance costs. MLA field safety representatives are an important part of the effort to make this change successful, and they work closely with OSHA when appropriate.

- 4) Forest Service personnel then outlined how they might update and revise Forest Plans for snags. The outline (Appendix 3) places greater emphasis on inventory, establishing a broader “context” for the existing situation, implementing a more active direct improvement program where appropriate, recognition of options related to logging equipment, strengthening contract language, and developing a temporal perspective based on insect and disease levels and future snag development. Part of the revision process will be a much closer awareness of safety needs and standards and implementation of workable solutions.

The ensuing discussion involved exchange of some very valuable perspectives and development of a much clearer understanding of agency roles and opportunities for cooperation. Two common themes evolved: (1) the importance of education/communication and (2) placing snag management within an ecosystem context.

As a means of continuing momentum from the meeting, it was agreed that we would carry the discussion into a presentation at this writer’s MLA meeting. Also, the Forest Service may participate in the updating and reprinting of the logging safety handbook. OSHA will forward a draft of proposed logging procedures for review and information.

This session was intended to initiate communication, identify roles, and lay the foundation for development of workable snag guidelines. All of these objectives were met and the consensus of the group is that many options exist for maintaining snags and decadent trees. It will be imperative to continue communications as we move ahead with guidelines. In the meantime, safety representatives for MLA (Paul Uken and John Hansen) are both willing to provide information and comment on specific problems.

Also enclosed for information are pertinent sections from the logging safety handbook and MLA manual.

Currently, there is a group composed of RO and Forest representatives that is working to formulate guidelines for Forest Plan revisions of snag/cavity guidelines. The effort is designed on an EM approach and will be built from the sale unit/site-specific situation to the drainage/landscape level and will include knowledge of insect/disease infestations and rates of development for snags. Our hope is to have draft guidelines by years end and that we can minimize safety problems as part of the effort.

/s/ Alan G. Christensen

Enclosures (5)

cc:

Tom Darden, WO

Steve Rickerson, R8

Paul Uken, MT Logging Assoc.  
Virgelle Howell, OSHA