

Where Did We Get Our Hotshot Crews?

By Lincoln Bramwell, PhD, Historian, USDA Forest Service

Interagency Hotshot Crews (IHCs) form the backbone of the Forest Service's response to wildland fire. IHCs are twenty-person, rapid response fire crews specializing in large fires the federal government dispatches to trouble spots across the nation. Due to their high levels of physical fitness, training, self-reliance and expertise, they are the Forest Service's elite firefighters, relied upon to fight the worst fires in the toughest terrain under the most dangerous circumstances. The Forest Service developed hotshot crews specifically to fight fires in the West's rugged terrain. After a 1935 decision to control all fires the morning following their first report and became national policy, the U.S. Forest Service designated hotshot crews as the means to achieve its policy ends.

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The loss of seventy-eight lives in the devastating Northern Rockies fires of 1910 provided the catalyst for public and Congressional support of fire suppression.¹ The 1911 Weeks Act legislated emergency firefighting funds making aggressive wildland fire suppression a reality. In the decade following the 1910 fires, the U.S. Forest Service experimented with various firefighting strategies. Newly designated Chief Henry S. Graves commented on the importance of using trained, organized crews to protect forests from blazes. In a 1910 Forest Service bulletin he wrote: "The following are of 1st importance: 1) Quick arrival at the fire; 2) and adequate force; 3) proper equipment; 4) a thorough organization of the fighting crew; and 5) skill in attacking and fighting fires."²

Following its increased desire to suppress wildfires, the Forest Service studied factors that led to large, destructive fires. After examining conflagrations such as the

Tillamook, Oregon burn of 1933 that scorched 270,000 acres, one of the principal causes of the failure to contain these blazes was the lack of explicit guidelines for initial attack.³

As one USFS forester recalled:

[Investigations of disastrous fires] found one characteristic common to all of them: lack of aggressive all-out action due to the 'too little or too late,' 'take-a-chance,' 'herd-em,' 'let-burn' attitudes resulting from fire-control policies then in effect in many places. With that germ isolated, the specific curative treatment was not long in being discovered and applied.⁴

The cure was a national fire policy that shaped suppression for the next forty-five years.

In 1935, USFS Chief Ferdinand Silcox issued a national wildland fire directive. Known as the 10 AM Policy, the mandate standardized the response to wildfire. The policy ordered firefighters to control a fire by 10 AM the morning after its first report, making aggressive fire suppression the standard response. Suppressing fires by 10 AM the morning after the report was also viewed as cost effective because it was far less expensive to suppress a number of small fires than to suppress one large conflagration.⁵

By 1939 the agency completed experiments and adopted two programs to carry out the 10 AM Policy goals. Conceived as small fire specialists, smokejumpers could quickly stop small fires in remote, roadless backcountry areas.⁶ If small fires grew into conflagrations, then specially trained forty-man crews would fight them for extended periods.⁷ Both programs were successful and are still used in modified forms today. As the West's remote backcountry shrank in size, smokejumping remained a small program.⁸ In contrast, the forty-man crew developed into the interagency hotshot program that serves as the foundation of campaign fire fighting efforts.

For many years, USFS fire wardens and management officers desired better-organized fire crews.⁹ With the restriction on using Civilian Conservation Corps

enrollees on fires during the 1930s, experiments began in 1939 to create economically efficient firefighting crews. L.L. Colvill, Assistant Forest Supervisor on the Siskiyou National Forest in Oregon, spent much of the previous summer battling the largest fires in the Pacific Northwest. He found fires in the backcountry presented problems for poorly conditioned, trained, and supervised fire crews. They simply took too long to get to a fire, were too worn out from the hike to be effective on the fireline, and were not adept at living away from their base for several days without considerable support. Colvill recognized the need for “trained crews of physically [sic] supermen capable of sustaining themselves on the fire line for periods of several days with a minimum of [support].”¹⁰ Intrigued, the Forest Service ordered the supervisor of the Siskiyou National Forest to organize a forty-man crew of “supermen” to test Colvill’s theory.

Nearly all future hotshot crew protocol and routine came from the Siskiyou experiment. First, the supervisors chose a junior forester with ten years of fire experience to lead the new crew. They based prospective members’ selection on their “physical prowess, woodsmanship, and self-motivation.” Operating on the “every private a captain” principle, the supervisors wanted experienced personnel who could make decisions during critical situations. Two recent hotshot superintendents wrote of the experiment’s guiding principles; “Professionalism, through organization, training, and experience incorporated not only safety, but a commitment to excellence, technical expertise, strong esprit d’corps, and a no excuses ‘can-do attitude.’”¹¹ One forester colorfully described the crew as “compact gangs of smoke-eating hellions in which every last man is a triple-threat to any fire.”¹² Potential candidates had to be males between the ages of twenty-one and forty in addition to having experience. Except for some

exceptions as fire lookouts, the Forest Service held a de facto policy that excluded women from firefighting. Because their duties required extended time away from their duty station, the job attracted unmarried foresters, a pattern that is still evident today. In addition to attracting a majority of unmarried foresters, the Siskiyou experiment attracted men from rural upbringings, comfortable with physical labor in the outdoors.

Each man carried enough provisions to support himself for three days in order to tackle fires in the inaccessible backcountry where logistical support was difficult to arrange. The supervisors on the Siskiyou estimated the caloric intake for each man at three calories per pound per hour. Thus, a 180-pound man working sixteen-hour days for three days required an amazing 25,920 calories. The high calories were essential to a crew expected to work at unprecedented speed to stop the first run of a fire. One forester described the crew's job: "It is man-killing work too, for the pace set is terrific and no woodsman likes to show or to admit fatigue."¹³

The forty-man crew experiment on the Siskiyou National Forest was a resounding success. Forest supervisors studying the performance of the crew after the 1939 season found that in the course of traveling over 3,000 miles to fight fires on five different national forests of varying fuel types, the crew constructed an average of three times the amount of fireline per hour than the regular Forest Service crews. The leaders of the crew felt that even this incredible figure underestimated performance because the fireline they constructed usually fell in the roughest terrain on the hottest part of the fire. Significantly, efficiency and lack of logistical support brought the costs of financing the forty-man crew to thirty percent below that of a comparable crew of Forest Service firefighters.¹⁴

America's entry into World War II took away much of the Forest Service's manpower, particularly the Civilian Conservation Corps firefighters, necessitating reliance on forty-man crews. The federal government recognized that protecting America's timber resources was essential to the war effort, but the military draft dramatically decreased the number of men the Forest Service could retain for fire fighting. During the war, women entered the firelines for the first time, replacing large numbers of men drafted into military service. Like most wartime occupations, women were laid off after the war to make way for returning servicemen. After being dismissed from the firelines, women did not return until after the 1964 Civil Rights Act prohibited discrimination on the basis of sex.¹⁵ The act however, did not bring an immediate return. Not until the early to mid-1970s did women work on firelines again. The very first woman to do so is lost to history; her story became a myth that varies from region to region.

After the war ended and the Forest Service permanently lost the manpower and large budgets from New Deal programs like the CCC, experiments began to reduce the forty-man crew's size and cost. Near the Siskiyou, the Willamette National Forest developed a smaller twenty-man crew. When fire calls came the crew gathered at prearranged points before traveling to the fire. Dubbed the "Willamette Flying 20," the supervisors organized the crew with one foreman and two squad bosses as overhead management, a pattern generations of hotshot crews subsequently adopted.¹⁶

By the end of the war, the twenty-man crew emerged as a more than adequate response to the 10 AM Policy. It also materialized as an exclusively male occupation. Early experiments illustrated how organization, training, and physical fitness combined

to create a fire crew that proved efficient, cost-effective, and safe. Recognizing that the experimental crews were given the toughest assignments and performed their duties with much greater speed and without significant injuries, Forest Service officials began to understand the potential benefits specially trained and organized hand crews had to offer.

Reliance on smaller variations of the original forty-man crew continued after the end of World War II. Routinely, the USFS pressed non-specialist employees into fire crews known as “regulars” for local fires, but to control fires by 10 AM required mobile, flexible and well-organized crews. By 1947, following the examples of the Oregon Red Hats and the Willamette Flying 20, twenty-man crews appeared in the chaparral covered national forests of Southern California.¹⁷ Based in the San Bernardino, Cleveland, Angeles and Los Padres National Forests, the Southern California crews first used the title “hotshot.”¹⁸ The new title reflected the speed of the mobile crews and their fearlessness as they shot into the hottest parts of the fire. It also was indicative of the self-confident image the crews wanted to portray as they instituted themselves as the most effective option to fighting large western fires. Streamlining as much as possible to decrease their response time to fires, these Southern California crews shrank in size but increased in effectiveness.

More than anything else, the development of mechanized fire equipment impacted crew structure. The original forty-man crews required eleven to eighteen men to fell trees and clear smaller vegetation with axes and hand-saws. By the 1950s new lighter power chainsaws required only six men to accomplish an equal or greater amount of work.¹⁹ The helicopter increased hotshot crew mobility by rapidly

delivering them into critical fire areas. The use of helicopters so impressed a 1950 fire conference in Ogden, Utah that it recommended “aerial shock troops” be stationed at critical locations throughout the nation. Despite advances in weather prediction and observation in recent years, firefighting technology changed little since the introduction of the helicopter and chainsaw. It is still left to firefighters on the ground with simple handtools to stop a fire’s advance.²⁰

The Forest Service established five Interregional (IR) Fire Suppression Crews in 1961 based on the 1950 Ogden conference’s idea to place “aerial shock troops” at strategic locations.²¹ The delay was due in large part to the size of the agency’s bureaucracy and the time it takes to adjust policy. Modeled on the half dozen hotshot crews operating in California in the 1950s, IRs consisted of close to twenty members. IR crews’ size, structure, and mobility place them in the same lineage of today’s hotshot crews. Beginning each June, an IR crew would remain on call twenty-four hours a day, seven days a week. When not on duty, sign out sheets informed supervisors of the whereabouts of crewmembers in case of a fire call. The IR crews were advantageous because they could reach any location in the West within six to eight hours, and arrived as a complete package: supervisors, crew, tools, radios, bedding and enough food for forty-eight hours.²² The Forest Service coordinated all requests for IR crews from the National Fire Control Center in Washington, DC.²³ By 1963 the number of IR crews had doubled to ten and the rapid growth rate continued before the hotshot program consumed them over the next decade.

In the 1960s hotshot crews began distinguishing themselves from “regular” fire crews through crew insignia, hats, and t-shirts. The pride associated with this

separation became one of the key ingredients to IHC success. Several crews began wearing shoulder patches on the new orange fire-resistant shirts first issued in 1961.²⁴ The El Cariso (California) Hotshots wore berets during the 1960s, in emulation of Special Forces in Vietnam. By this time hotshots crews adopted orange flame retardant shirts, hard hats, blue jeans and a pair of White's logging boots--a hand-stitched, cowboy-heel boot that could cost a month's salary--as their own standard fireline attire.²⁵

The IHC program enjoyed success and acceptance from federal fire officials by the 1970s. Struggling with the dual challenges of sharply rising fuel and mechanized equipment and aircraft costs and shrinking budgets related to the national recession, the USFS searched for ways to save money.²⁶ The hotshot program received praise for its cost efficient performance. Fire management officers pointed out that hotshot crews produced fifty percent more fireline than regular Forest Service crews.²⁷ One fire officer on the Tonto National Forest in Arizona explained that three hotshot crews on his forest saved millions of dollars in projected suppression costs and resource losses.²⁸

By the end of the 1970s, a number of forest ecology and wildlife researchers, along with acts of Congress and new fire management techniques, combined to alter federal fire policy. The 1964 Wilderness Act declared designated areas within national forests off limits to mechanized fire suppression equipment. In addition, some fire managers recognized that fire equipment such as bulldozers sometimes damaged more land than they protected. New research on forest ecology, particularly in relation to wilderness areas, began to suggest fire played a beneficial role in forest ecosystem health. Concurrent with this, the controlled application of fire to the ecosystem, known

as prescribed burning, gained wider acceptance as an effective tool to increase forest health and prevent large conflagrations.²⁹ All these factors led to the replacement of the 10 AM Policy at a National Fire Planning Meeting in Denver in July 1977. The new National Forest Manual rejected the old policy's implicit assumption that all fires were bad. The new management policy still mandated aggressive initial attack on fires, but if initial attack failed, the incident commander had many more alternatives, such as allowing naturally caused fires to run their course or initiating a cost benefit analysis before extended suppression efforts began. Hotshots had little to do with the 10 AM Policy's abandonment, and despite the policy alteration, hotshots' job on the ground did not change.³⁰

Concurrent with the new policy the first females broke into hotshot crew ranks in the late 1970s. Besides the biggest hurdle of the physical ability to do the work, once on the job female hotshots had to endure the sexism and chauvinism of a formerly all-male occupation and the extra pressure and scrutiny this entails. The path-breaking women experienced a combination of acceptance and resistance. The loudest resistance most often came from the older generation of fire fighters and managers. For example, Carl Hickerson, head of USFS fire operations for the Pacific Northwest region in the early 1970s, repeated a speech to senior fire officials over the course of a year and a half titled, "Should Firefighters Wear Petticoats?" His argument, that women lacked the emotional stability to make critical decisions and their presence would diminish the stature of firefighters, was enthusiastically received. "I simply cannot imagine a truly feminine woman even considering fire suppression work, and all the adversity, filth, and hazard it entails," Hickerson claimed.³¹ In fire camps, the first women endured

whistles, stares, and obscenities. Former hotshot Lael Gorman recalled, “Back then, I knew I was in a job that was basically a man’s world. I told myself that I had chosen to be there, so I accepted a lot...I accepted things in that time that no woman would accept now and that most men would find objectionable.”³² One of the first female hotshots, Cheryl Surface-Wilcock, remembered entering the Silver State Hotshots’ ready room in Carson City, Nevada in 1977 to find the walls plastered with *Playboy* centerfolds. Often the public’s introduction to female hotshots was skeptical as well. Surface-Wilcock remembered washing off soot from a fire in a restaurant’s women’s bathroom to the horror of other female patrons. One asked, “You mean they let girls fight fire?” Her fellow female hotshot chimed in, “No ma’am, we just make sandwiches and sweep rocks.” Satisfied, the patrons returned to their meals.³³ As more women broke down the all-male world of wildland firefighting and hotshot crews in particular, they won the begrudging respect of their peers.

During the last quarter of the century, increasing outdoor recreation and home building at the edges of forests and grasslands put more lives and property at risk of wildfire than ever before.³⁴ In one policy review the Forest Service warned that “More and more people are moving away from the city...and away from things they generally take for granted, like fire protection. A house or a group of houses in an otherwise undeveloped area can turn a routine fire into a nightmare for firefighters and homeowners.”³⁵ As an “ex-urban” population reclaimed the rural landscape, the need for hotshot crews that could handle the technical challenge of urban interface fire escalated. The hotshots accepted the increased suppression burden. By 1982 there were fifty-four hotshot crews nationwide.³⁶ The Department of Interior started its own

hotshot crews among its subordinate agencies. Starting with the Park Service's Arrowhead, Alpine, and Buffalo hotshot crews, the Bureau of Land Management and Bureau of Indian Affairs each fielded hotshot crews by the 1980s.

Hotshot crews, now totaling one hundred and eight, continue to shoulder the responsibility of suppressing large fires.³⁷ With ever increasing pressure by the public to protect its urban/rural interface homes and the extremely high complexity of that challenge, the specialized skills of the hotshots remain in high demand. Stretched to the limits to protect homes and natural resources and driven by their can-do attitudes, hotshot crews suffered a number of fatalities in the last half of the 20th century. In light of recent tragedies, however, fire management has adopted the tenet "Firefighter safety comes first on every fire, every time."³⁸ While the public's perception of the Forest Service's ability, obligation and eagerness to suppress all wildland fires may not change, the agency and the hotshots themselves recognized there are definite limitations to their fire suppression mission. Their tempered aggressiveness is reflected in today's National Interagency Hotshot Crew Steering Committee's official motto: "Safety, Teamwork, Professionalism."³⁹

Wildland fire is an ever-increasing threat in the West. The intensity and frequency of fires crescendo each year.⁴⁰ As more and more people move into formerly rural areas, the demand for fire suppression and protection increases each year. Examining the history of the elite firefighters relied upon to carry out these demands provides a better understanding of the changing nature of federal fire policy and its relationship with the men and women who implement that policy.

¹ Jim Cook et. al., *Lessons Learned, Fatality Fire Case Studies PMS 490*, Trainee Workbook, (Boise, Idaho: National Wildfire Coordinating Group, December 1998), 2. See also Stephen Pyne. *Year of the Fires: The Story of the Great Fires of 1910*, (New York: Penguin Books, 2002).

² Graves, "Protection of Forest from Fire" *Forest Service Bulletin*, no. 82, 1910.

³ Stephen J. Pyne, Patricia L. Andrews, and Richard D. Laven, *Introduction to Wildland Fire*, (New York: John Wiley & Sons, 1996), 412. The first of the Tillamook destroyed over 270,000 acres of dense Douglas-fir timber in the coastal range of Oregon in August of 1933. The region burned successively almost every six years until by 1951, nearly 3 million acres of timber had burned in the area.

⁴ Earl W. Loveridge, "The Fire Suppression Policy of the U.S. Forest Service," *Journal of Forestry*, 42 (1944), 552.

⁵ Ibid., 552. Pyne, *Fire in America*, 282-286.

⁶ There are many records and accounts detailing the inception and growth of the smokejumping program. For early accounts of this see "History of Smokejumping," (U.S. Forest Service, 1976); "History of Smokejumping, 1939-1949," *Fire Control Notes*, 11 (July 1950), 1-11; David P. Godwin, "Smokejumping," *American Forests*, 45 (December 1939), 590 -592; and "The Parachute Method of Fire Suppression," *Journal of Forestry*, 39 (February 1941), 169-171. The National Smokejumper Association released an excellent visual history in 2000. The video is available directly from the Association at PO Box 4081, Missoula, MT 59806-4081.

⁷ In an effort to stop a fire, wildland firefighters construct breaks in the vegetation known as firelines. By cutting away vegetation with saws and digging away the remaining organic material down to mineral soil, a fireline starves the fire of fuels to burn, thereby stopping a slow moving blaze.

⁸ Craig Chandler, et al., *Fire in Forestry: Volume II: Forest Fire Management and Organization*, (New York: John Wiley & Sons, 1983), 123.

⁹ Pyne, *Fire in America*, 368; Guthrie, 238; " 'One Lick' Method on the Chippewa," *Fire Control Notes* (1937), 301.

¹⁰ L.L. Colvill, "Lessons From Larger Fires on the Siskiyou," *Fire Control Notes*, 3 (July, 1939), 20-21.

¹¹ Paul Linse and Larry Edwards, "Beyond 2000: will the Hotshot Legacy Continue?" *Wildfire* 6, no. 2 (June 1997), 4.

¹² Stewart H. Holbrook, "Forty Men and a Fire," *American Forests*, 46 (June 1940), 251-253.

¹³ Holbrook, 253.

¹⁴ Cliff and Anderson, 47-62.

¹⁵ Claire M. Renzetti and Daniel J. Curran, eds. *Women, Men, and Society: The Sociology of Gender* .(Boston: Allyn and Bacon, 1989), 175-176, 198.

¹⁶ Roy Elliott, "The Willamette Flying 20," *Fire Control Notes*, 5 (October, 1941), 179-180.

¹⁷ There is no definitive answer as to which fire crew referred to itself as a "hotshot" crew first. Stanley Stevenson, the fire control officer of the Cleveland National Forest mentioned the El Cariso Hotshots from the Cleveland N.F., and the Del Rosa Hotshots on the San Bernardino N.F. Stanley Stevenson, " "Hotshot" Crews," *Fire Control Notes*, 12 (April 1951), 29-31. As an editor's note in the preface to a reprint of this article in *Wildfire*, the Chileo Hotshots, formed in 1949 on the Angeles N.F., were mentioned as "the first to form as an official hotshot crew." See Stanley Stevenson, " "Hotshot" Crews," reprinted in *Wildfire*, vol. 6 (June 1997), 16.

¹⁸ There has been quite a bit of discussion and little documentation as to how the term "hotshot" originated. Stephen Pyne writes that special fire fighting crews organized in CCC camps in the 1930s were sometimes know as hotshots. In the 1940s, a number of 40-man crews organized in Southern California were referred to as hotshot crews. In an editor's note in *Wildfire* magazine, one more explanation is added: "Harry Grace, a former Fire Control Officer on the Angeles National Forest, tells how he thinks the term "hotshot" got started: "Walt Jefferson (Jeff), about the middle of the war in 1944, (was sent to) a fire raging on the Klamath. 'Hell of a fire.': He found virtually no manpower available, everybody in the region was involved at the time, so he organized these people, administrators and office people, and called them jokingly his 'hot shots.' Harry seemed to feel that's where the term started. Cause I know in 1946 or '47, we had a fire in Little Rock Canyon, on the Valyermo District, and a crew came over from the Los Padres, and they called them hot shots. That's were [sic] I first heard the term. They were the only crew, as such , as hot shots. I forget where they were based. I have a feeling it could have been San Marcos. Called it the Sycamore Fire. It was across from Sycamore campgrounds." Editor's Note to Rolfe E. Anderson, Boyd L.

Rasmussen, and Verne V. Church, "Adapting Advanced Principles of Organization and Fire Line Construction to CCC Suppression Crews," reprinted in *Wildfire* 6, no. 2 (June 1997), 8.

¹⁹ The Sawtooth IHC travels with eight chainsaws while the Logan IHC travels with 10. This is more than three-times the number of chainsaws a regular fire crew handles and indicates how much more fireline an IHC can clear. Normally, three saws are carried into any fire assignment, requiring three sawyers and three swamper to clear the downed vegetation.

²⁰ "Topic 3. Aerial Fire Control," in "Servicewide Meeting. Fire Control, Fire Research, and Safety. Ogden, Utah, 1950" (U.S. Forest Service, 1950), 8. Ralph G. Johnston, "Helicopter Use in Forest Fire Suppression; 3 Decades," *Fire Management Notes*, 39 (Fall 1978), 14-16. Stevenson, 29-30.

²¹ Martin E. Alexander, "High Mobility: The Interregional Fire Suppression Crew," *Fire Management* 35 (Summer 1974), 15.

²² *Ibid.*, pp. 14-17.

²³ "Interregional Crew," *Fire Control Notes*, 24 (Oct. 1963), 93.

²⁴ Alexander, 16.

²⁵ Stephen J. Pyne, "Flame and Fortune," *Wildfire*, 3 no. 3 (September 1994), 34. Pyne, *Fire in America*, 384. In "Dad and I and the Forest Service," *Wildfire* 6, no. 2 (June 1997), Doug Campbell recalls some of the firefighter attire changes in the early years of the hotshot crews. When he started with on the Angeles National Forest in 1952, he was required to wear Levi's and a khaki long sleeved shirt and 8" top boots. In 1961 as the superintendent of the El Cariso Hotshots, Campbell recalled "Ted Zerlak, a graduate forester...walked into camp wearing White [sic] Boots and a Filson Cruiser vest. Our boots were Redwing or Chippewa lace to tow and we had not one vest among us. I think it was Ted Zerlak that started the White's Boot and Filson Cruiser vest hotshot uniform in California," Campbell, p.24.

²⁶ Pyne, *Fire in America*, 292.

²⁷ Lynn Biddison, "The Changing Role of Fire Management," *Fire Management Notes*, (Winter 1977-78), 20.

²⁸ Jerry Ewart, "Hotshot Crews Pay Big Dividends," *Fire Management*, 37 (Winter 1976), 14-16.

²⁹ Schiff, Ashley L. *Scientific Heresy in the Forest Service* (Cambridge, MA: Harvard University Press, 1962).

³⁰ L.T. Egging and R.J. Barney, "Fire Management: A Component of Land Management Planning," *Environmental Management*, Vol. 3 no. 1 (1979), 15-20; see entire issue of TTFFC no. 14; Lynn R. Biddison, "Legislative and Economic Realities: Impacts on Federal Agencies," in Richard G. Barney, ed., *Fire Control for the 80's* (Missoula, Mont.: Intermountain Fire Council, 1980), 34-37; Chandler, et al., 5-7. Pyne, *Fire in America*, 291-294.

³¹ Thoele, 139-140.

³² *Ibid.*, 149.

³³ Bushman interview. Cheryl Surface-Wilcock, "Making Sandwiches and Sweeping Rocks," *Wildfire* 6, number 2 (June 1997), 32-35.

³⁴ Margaret Fuller, *Forest Fires: An Introduction to Wildland Fire Behavior, Management, Firefighting, and Prevention*, (New York: John Wiley & Sons, 1991), 32.

³⁵ Federal Wildland Fire Management Policy and Program Review. "Answers For Public Land Users and Neighbors," 1995. In possession of author.

³⁶ Rowe Findley, "Our National Forests: Problems in Paradise," *National Geographic*, vol. 162, no. 3 (September 1982), 330.

³⁷ U.S. Forest Service, "Hotshots" http://www.fs.fed.us/fire/people/hotshots/IHC_index.html (accessed September 11, 2009).

³⁸ Michael G. Apicello, "FIRE 21-Fire Management in the 21st Century," *Fire Management Notes* 56, No. 3 (1996), 4.

³⁹ U.S. Forest Service, "Fire Policy" <http://www.fs.fed.us/fire/policy.html>. (accessed April 6, 2000). Cover. National IHC Steering Committee 2004 Newsletter. In possession of author.

⁴⁰ J.L. Pierce, G.A. Meyers, and A.J.T. Jull, "Fire-induced Erosion and Millennial-Scale Climate Change in Northern Ponderosa Pine Forests," *Nature* vol. 432, 4 November 2004, 87-90. Thomas V. Veblen, Thomas Kitzberger, and Joseph Donnegan, "Climatic and Human Influences on Fire Regimes in Ponderosa Pine Forests in the Colorado Front Range" *Ecological Applications* vol. 10, no. 4, pp. 1178-1195. P.M. Brown, M.W. Kaye, L. Huckaby, and C. Baisan, "Fire History Along Environmental Gradients

in the Sacramento Mountains, New Mexico: Influences of Local Patterns and Regional Processes” *Ecoscience* vol. 8, pp. 115-126. W.W. Covington et al., “Historical and Anticipated Changes in Forest Ecosystems of the Inland West of the United States,” *Journal of Sustainable Forestry* vol. 2, 1994, pp. 13-63. M.G. Rollins, P. Morgan, and T. Swetnam, “Landscape-scale Controls Over 20th Century Fire Occurrence in Two Large Rocky Mountain (USA) Wilderness Areas,” *Landscape Ecology* 17, 2002, pp. 539-557.