EVALUATING THE EFFECTIVENESS OF THE BATES BILL AND OTHER WILDLAND URBAN INTERFACE FIRE PROTECTION MEASURES FOR THE HEALDSBURG FIRE DEPARTMENT

EXECUTIVE LEADERSHIP

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ABSTRACT

The Healdsburg Fire Department (HFD) provides fire protection for the City of Healdsburg, with eight paid staff, and a number of volunteers. Located 70 miles north of San Francisco, much of Healdsburg is built amongst the brush covered hills along its northern and eastern boundaries. The HFD has recognized this area as a Wildland Urban Interface (WUI) area susceptible to the threat of vegetation fires. This was validated in 1993 when a change in state law known as the Bates Bill, required the HFD to enact a series of fire safety regulations after the area was identified as a Very High Fire Hazard Severity Zone (VHFHSZ), by the California Department of Forestry & Fire Protection (CDF).

Given the limited resources of the HFD and the absence of funding provided by the legislation, it was recognized these regulations would be difficult to implement without prioritizing them. Therefore, the purpose of this research was to identify what parts of the legislation, or any other locally enacted fire safety measures or programs have proven most effective in minimizing the WUI fire problem in those areas with VHFHSZ's. Using this data, the HFD could then prioritize its efforts so as to focus on those proven aspects and enhance its prevention efforts.

Using descriptive and evaluative research methodologies, the following research questions were asked:

1. Which Bates measures have been tested in wildfire situations and found to be effective?
2. What other wildfire protection measures or programs have been enacted locally and if tested in wildfire situations, found to be effective?

3. Which measures identified would be the most effective in mitigating the WUI threat, given the HFD's limited resources?

To perform this research, over 100 fire agencies with VHFHSZ's in the State of California were surveyed to determine the success of the Bates Bill and other WUI regulations in their jurisdictions. A series of interviews were conducted with the Assemblyman who drafted the legislation, experts in this field and individuals who had published articles on this topic. In addition, a review of available literature was performed.

The results found one Bates requirement, and five other measures that had proven effective in wildfire situations and could be implemented in the HFD given the limited staff available. They included; requiring 30' vegetation clearance around structures, implementing an annual Weed Abatement Program, developing automatic aid policies with neighboring fire agencies, implementing Public Education Programs including those utilizing Fire Safe Councils, and enacting Fire Resistive Roofing and Residential Fire Sprinkler Ordinances.

The recommendations of the research is for the HFD to implement more aggressive vegetation clearance and public education programs, initiate automatic aid agreements with neighboring agencies for WUI fires, and continue to advocate and proactively support its existing Weed Abatement program and Residential Sprinkler and Fire Resistive Roofing Ordinances. Implementing such programs would allow the HFD to demonstrate it efforts to enforce the Bates Bill, while minimizing the impact to the organization and enhancing the fire safety of the community.

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INTRODUCTION

The Healdsburg Fire Department is a small department of eight paid staff and a number of volunteers who provide fire protection to the City of Healdsburg, a town of 10,000 people, located approximately 70 miles north of San Francisco, California. Over the last 50 years, much of Healdsburg's growth, including plans to build over 200 homes during the next several years, has occurred on the brush covered hills that surround its northern and eastern boundaries.

The Healdsburg Fire Department (HFD) has long recognized this region as a Wildland Urban Interface (WUI) area susceptible to the threat of vegetation fires. This concern was validated in 1993, when pursuant to a State law known as the Bates Bill (Appendix A), the fire risk of the area was evaluated by the California Department of Forestry & Fire Protection (CDF). As a result of this evaluation, the area was declared a Very High Fire Hazard Severity Zone (VHFHSZ) by the State of California. With this designation, the HFD was given a mandate to enforce a number of newly implemented State fire safety regulations in its VHFHSZ, but without any accompanying funds to implement such a program.

Given the limited resources of the HFD to enforce the provisions of the Bates Bill, the purpose of this research was to identify what parts of the legislation, or any other locally enacted fire safety measures or programs have proven most effective in minimizing the WUI fire problem in those areas with identified VHFHSZ's. Once identified, the department could improve the efficiency of its prevention and enforcement program by

prioritizing its efforts on those regulations or programs that were found to be most successful.

Using descriptive and evaluative research methodologies, the following research questions were asked:

1. Which Bates measures have been tested in wildfire situations and found to be effective?
2. What other wildfire protection measures or programs have been enacted locally and if tested in wildfire situations, found to be effective?
3. Which measures identified would be the most effective in mitigating the WUI threat in Healdsburg, given the HFD's limited resources?

To address these questions, a literature review was performed, and a series of meetings and interviews were held with State Representatives and CDF. In addition, a survey instrument was distributed to all 107 agencies with VHFHSZ 's identified in their jurisdictions to find what WUI protection measures have proven to be most effective.

BACKGROUND AND SIGNIFICANCE

The City of Healdsburg, California is a rural "bedroom" community situated along the valley formed by the Russian River and extending into the surrounding brush covered hills. About five square miles in size, the city is home to a population of approximately 10,000, located 12 miles north of Santa Rosa, California (see Figure 1).

Like many small municipalities, the HFD has always had limited staffing, relying

heavily upon volunteers. For example, in 1867, the first volunteer fire company was formed to protect the City. In 1936, the department supplemented its volunteer ranks by staffing two firefighters 24 hours a day; a figure which has not been increased to date, despite a four-fold increase in the city's population (R. Taylor, personal Interview, May 5, 2000).

Compounding this problem was the fact that as the flatlands around the Russian River were built upon, development spread into the surrounding hills. Covered with thick, flammable vegetation and served by steep and narrow roads, the threat of wildfire grew with the corresponding increase in development. This threat has been exemplified by the fire history of the lands around Healdsburg and the County which have experienced eight major wildland fires since 1947.

In response to this threat, the HFD made a concerted effort to formally highlight this problem in the revision of the City's General Plan in 1986. As a document that provides an outline for a municipality's growth over a 20 year period, the General Plan identified factors that would have a negative influence on development, along with any potential mitigating measures. The HFD saw the General Plan as a vehicle to increase the awareness of the area's fire problem and through its efforts, included a Fire Protection Element identifying the brush covered hills as a "High Fire Hazard" Area (see Figure 2). However, despite these efforts and even a 1988 wildland fire that seriously threatened the town and destroyed three homes, complacency quickly returned and the area's vulnerability continued to be ignored or discounted by a largely ambivalent public until the fall of 1991.

On October 20, 1991, an event occurred that was to have a significant impact on wildfire protection efforts throughout California; the Oakland/Berkeley Fire Storm.

Starting as three-acre brush fire on October 19th, the fire did not become a major incident until the following morning when during mop-up activities, a wind driven spark was blown into a fuel rich spot outside the burn area. With the same wind acting like a bellows, the fire quickly ran out of control and within one hour, ignited 790 structures. By the time the fire was brought under control Wednesday morning, 25 people had been killed, 150 injured, and 1600 acres had been burned. In terms of damage, the fire destroyed 3354 single family homes, 456 apartments, and did an estimated $1.5 billion in damages. To suppress the fire, mutual aid was required from over 248 agencies, including the HFD (1992, State of California).

Having participated in that response and seen the damage first hand made the utter devastation caused by a fire of that magnitude all too clear (see Figures 3 & 4) and the vulnerability of Healdsburg to the same type of catastrophe.

Like most disasters, one outcome of the Oakland/Berkeley Fire Storm was legislative action to prevent such a disaster from repeating itself. The result was a piece of fire safety legislation that would turn out to be one of the most significant in California history (1999, State of California). Known as Assembly Bill (AB) 337, it quickly became known as the Bates Bill after its author, Assemblyman Tom Bates who represented Oakland and Berkeley in the California Assembly. The original intent of the legislation was to create a single fire district to provide a more coordinated response to any future fires that should occur in the area. However, after receiving input from a

group of fire authorities, the end result was a document that instead of focusing on the consolidation of the respective fire agencies, developed a set of fire safety regulations To be applied consistently throughout the State (T. Bates, personal interview, March 10, 2000).

Ironically, despite California's extensive fire problem, prior to the Bates Bill, the authority to apply wildland fire safety regulations throughout the State was not uniform. In those area's protected by CDF (known as State Responsibility Areas or SRA), Section 4291 of the State Public Resources Code required a property owner to keep their home in a fire safe condition by maintaining a minimum 30' firebreak around the structure and an approved screen over chimneys and keeping tree branches 10 feet away. In addition, roofs had to be maintained free of litter and dead vegetation. However, in those areas within incorporated cities and in many fire districts where the primary responsibility for fire protection belonged to an authority other than CDF (known as Local Responsibility Area or LRA), these regulations were not enforceable unless adopted by a local legislative body. This was the case in Oakland on October 21, 1991.

The subsequent conflagration brought this weakness to the attention of the legislature which acted to correct this inconsistency. To accomplish this, the Bates Bill specifically directed CDF to review, in cooperation with local agencies, any LRA, which might meet the criteria of a VHFHSZ. When CDF contacted the HFD in 1994 to conduct its evaluation of the City of Healdsburg, the HFD provided a copy of the High Fire Hazard Map included in the City's General Plan for review by the CDF evaluators (see Figure 2). After studying the map and the corresponding area, CDF concurred with the

findings of the HFD and identified the area as a VHFHSZ (or Bates Zone) with a few slight modifications (see Figure 5). Although the HFD was encouraged to have its findings validated by an outside agency with tremendous expertise in this field, this was to prove bittersweet. For with the declaration of the VHFHSZ, the Bill also required the provisions of Section 4291 of the Public Resources Code to be enforced locally by the HFD in the Bates Zone, creating additional responsibilities that would be difficult to meet given the size of the department and its limited resources. Compounding this problem was a finding by the State legislature that because the Bill would reduce costly wildland fires, it would produce significant savings for taxpayers. Therefore, the State would be exempt from having to reimburse local agencies, like the HFD, as specified in the State Constitution.

The result was a state mandated LRA fire hazard assessment and zoning program, with related minimum fire safety standards to be adopted at the local level, but without a funding mechanism.

In an attempt to comply with this mandate, in 1995, the HFD initiated an educational program to inform the public of the change in state law brought about by the Bates Bill. Using information provided by the County's Assessor's Office, property owners in the Bates Zone were identified. An informational brochure, including a self-inspection checklist was prepared and mailed . Although several hundred flyers were mailed, less than two percent were returned and only one site inspection was requested by a homeowner in the affected area. Given this poor response, it was clear the public was still largely ambivalent to the threat of wildfire and alternate means of education and

enforcement would be necessary to implement the Bates requirements. However, with the limited resources available to the department, this would be a long and difficult task. To compensate for this weakness, it was believed any efforts should be prioritized beginning with those regulations that had proven to be most effective in mitigating the WUI problem in other areas in the State. Accordingly, it was felt a survey instrument issued to all other jurisdictions in California with identified Bates Zones would provide a valid approach to make these findings. These findings could then, be evaluated to determine their applicability in the Healdsburg Bates Zone.

This research is relevant to the Executive Leadership Course since successful implementation of a Wildfire Mitigation Program would require managing multiple roles as found in Unit 4 of the Executive Leadership Course.

LITERATURE REVIEW

A review of the literature available on this topic revealed a series of reoccurring issues.

Problem Magnitude

Foremost amongst a series of published documents were articles that illustrated the growing magnitude of the wildland/urban interface problem in the State of California. For example, in a historical summary of wildfire losses in the State, the *Wildland Fire Hazard Assessment* Report made the following finding.

> In the 25 year period of 1955-1979 there were 2,408 structures lost

> to wildfires, yet in the 14 years following (1980-1993) over three times as many structures (7,698) were lost. From 1990 through 1998, 5,355 structures were lost to wildfire in just eight events. (p. i)

A review of the more recent 1999 fire season revealed that in State areas protected by CDF (not including most incorporated cities, National Forests & areas protected by the Federal Government), fires caused over $134 million of damages and cost $145 million to suppress (CDF Homepage).

A summary of California wildfires in the California Fire Plan made the following broader findings: Risk from wildfire to life, property, natural resources is increasing, more people will live and use wildland areas, drought and fuel moisture conditions will be unpredictable but almost always dangerous in fire season, more structures will be constructed in areas that are very susceptible to wildfire and, the public demand for wildland fire protection and other services will increase (State Board of Fire Services, 1996). Even the report on the East Bay Hills Fire by the Governor's Office of Emergency Services emphasized that massive conflagrations like that experienced in Oakland may well occur again without aggressive fire mitigation efforts (Governor's Office of Emergency Services, 1992).

Given the growing frequency of these disasters, the enormous suppression costs and the limited resources of the HFD, it would appear focusing on prevention efforts would provide the most cost effective method to deal with this problem.

Vegetation Management

During a review of the literature it became apparent that vegetation management

was found as one method to minimize the hazard presented by fires in the WUI.

One author attributed the planting of ornamental shrubbery such as Conifers, Eucalyptus, Cyprus, Acacia and Baccharis, as a severe fire threat to structures. Citing personal experience in fires in Los Angeles County as far back as the 1980's he illustrated how the presence of such plantings allowed a fire to spot several blocks ahead of itself. Conversely, those homes with low volume shrubbery had survival rates that were significantly enhanced (Franklin, 1990).

The benefits of fire resistive landscaping was echoed by O'Conner who identified "Firewise" landscaping with four distinct zones as an essential component of protecting structures in the wildland/urban Interface (O'Conner, 1998).

Another manner in which vegetation management was found to minimize the fire threat was through the use of weed abatement programs. In the City of La Habra Heights, California in Los Angeles County, an aggressive Annual Weed Abatement campaign, was claimed to provide an effective means to protect structures in the WUI. Successful results were also achieved when the WUI encompassed areas designated as a Nature Preserve regulated by an independent Conservation Authority and exempt from Bates regulations. When La Habra Heights conducted negotiations with such body, the result was the establishment of fire breaks that enhanced the fire protection of the area (Nelson, 1999).

Public Education

One method cited by several authors to minimize wildland fire threat was through aggressive public education programs using the team approach, all of which claimed to

have significant results. For example, in United States Forest Service (USFS) lands in New Mexico, a Functional Area Support Team (FAST) was formed to deliver education programs in the Lincoln National Forest in New Mexico. Consisting of specialists in the fields of Fire Operations, Fire and Fuels, Fire Information and Public Affairs, the team would evaluate the fire hazard of a specific area and use members of the community in a mock emergency exercise to illustrate the severity of the problem. The end result was the passing of the worst fire season on record without a major fire (Glenn, 1997).

The team concept was also used successfully in Texas to minimize fire occurrence during the 1998 drought in the Southwest. Known as Wildland Fire Prevention & Education Teams, they were given a mission to assist the Texas Forest Service and local fire departments in their efforts to reduce the number of human caused wildfires. To accomplish this, the residents were informed of the extreme fire danger, interest was generated in preventing wildfires, and the public was educated about fire safety actions that would reduce the number of ignitions. Consisting of a Team Leader, one or more Fire Prevention Specialists, Public Affairs Specialists and Incident Command Staff Positions, the team created a visible reduction in fire incidence and was heralded by the Governor and Vice President as “a national standard in rural land fire protection in America” (Tunnell, 1999).

A third team approach to minimizing wildland fire threat involved the use of four Fire Prevention and Public Affairs Specialists from the National Park Service (NPS) and the Bureau of Land Management (BLM) during the wildland fire siege in 1996 in the southwest. Working with Fire Management Specialists and local agencies, the teams

implemented programs to help coordinate prevention efforts among local agencies, identified innovative prevention programs at the field level, reinforced and supported those programs at a regional level, and communicated the programs to other agencies. The end result was a reduction in fire starts immediately following the program despite an increase in the fire danger (Downing, 1997).

Conversely, a lack of public education was also found to be a problem in many WUI areas. In one California research project that evaluated fire protection in these regions, homeowners were overwhelmingly found to be unaware of the fire risk in these areas and the foremost recommendation was to develop and support public education programs (Gilbert, 1995).

Land Use Planning

Utilizing local planning agencies was identified as another tool to enhance fire protection to WUI areas. Although under utilized in the past, in the wake of recent fire history, many local agencies are re-evaluating their planning departments role in fire protection. In Washington State's Chelan County, the Planning Director indicated that a newly passed Growth Management could be used as a tool to limit building in WUI areas unless local fire districts were found to have sufficient resources to do their job (Pumphery, 1993). Similarly, in Boulder County, Colorado, a tool known as the *The Wildfire Hazard and Mitigation System* was cited as a good example of how to manage fire risk (Lavin, 1997).

Pre-Fire Planning

The use of Pre-Fire Planning including the development of strategic objectives, the coordination of resources, weather forecasting, and evacuation procedures was illustrated as an effective means to combat the growing WUI problem. Such efforts were reported as far back as 1988 after wildfires destroyed more than 76 homes in North Carolina. As a result of these losses, a WUI Task Force was established consisting of State, County and Local agencies. The Task Force performed such activities as identifying areas subject to fire activity and providing education and training for the residents in these areas. In addition, action plans were developed that identified a range of issues pertinent to fire suppression activities such as fuel modeling, water sources, a transportation plan, evacuation routes, staging areas and helispots to name but a few (NFPA, 1988).

Similar Pre-Fire Planning was also described as having been developed at the Grand Canyon National Park in Arizona utilizing a tiered system tied to fire weather conditions. Due to the limited resources available in the semi-remote region, the plan took advantage of mutual aid, including agencies from as far as 85 miles away. In addition, the plan included a comprehensive evacuation plan in response to the large tourist population common to the park (Winston, 1998).

A more evaluative approach to Pre-Fire Planning was offered by Mark Bisbee who cited a pre-fire plan as a document that has the potential to make this difference between a small manageable incident and a regional disaster. In an evaluative approach, the author went so far as to identify the essential elements of a Pre-Fire

Plan to include; fire behavior models, fuel characteristics, topography, weather monitoring, strategic objectives, incident management, access and evacuation, staging areas, water supply, mapping, and plan implementation and training (Bisbee, 1993).

Attitude Change

Whereas most of the literature focused on what could be perceived as tangible matters related to the WUI problem, several authors categorized it as a problem that can best be solved by a change of attitudes and behaviors. For example, one writer argued that aggressive fire education programs in the community will eventually result in the community adopting firewise behaviors and cited such models as Mothers Against Drunk Driving (MADD) and national non-smoking and recycling programs as successful examples (Cook, 1997).

Other writers discussed the dichotomy of attitudes that exist about fire prevention in the urban, as opposed to the rural environment. To illustrate this, a comparison of the codes governing a building highrise verses the WUI was made. In addition, the amount of resources directed to structural based fire education programs as opposed to the small fraction spent on wildland programs was described. To further prove their point, the authors commented on how each year, the country commemorates Fire Prevention Week on the anniversary the Great Chicago Fire of 1871. However, on the very same date in 1871, a forest fire In Peshtigo, Wisconsin killed over 1,200 people, almost 1,000 more than were lost in Chicago. Yet few, including many fire professionals know of the Peshtigo Fire while the Great Chicago Fire is engrained in our

national psyche. Not until these attitudes changed, will WUI programs become truly effective (Cole, Foote, 1993).

These thoughts were echoed by another author who concluded, fire service leaders should ask themselves if their community would receive greater benefit from inspecting fully sprinklered high-rise buildings, or by redirecting inspection resources to the WUI (Brown, 1994).

Another tool used to effect attitude change was through the use of Fire Safe Councils. These organizations comprised of fire professionals, the insurance industry, public utilities, homeowners, and public stakeholders, rely on the use of partnerships to educate the public as to the severity of the WUI fire problem and promote attitude change. By involving organizations with such wide and diverse representation, the appeal and subsequent success of the group is greatly enhanced. Ironically, one example known to the author and cited by Chief Dana Cole, Pre-fire Management Specialist for CDF was the local council, Fire Safe Sonoma *(FSS).* By taking advantage of the support of the organization, Chief Cole spearheaded a joint effort with FSS, HFD, CDF, and the County of Sonoma to prepare a grant to conduct a vegetation management program in the Healdsburg VHFHSZ (D. Cole, personal interview, February 23rd, 2000).

PROCEDURES

Research for this paper began in the fall of 1999, during the completion of a project to construct a fire break within the VHFHSZ . Due in large part to the problems experienced funding the project, the difficulties of implementing the Bates Bill became apparent along with the need to prioritize the HFD's efforts and explore alternate means to meet the intent of the legislation.

Research Population

The first step in accomplishing this task was to identify those jurisdictions throughout California that possessed VHFHSZ's. To do this, numerous inquiries were made with the local CDF Ranger Unit which ultimately led to contact with Melissa Frago of the Fire Engineering division of CDF. On February 7th, 2000, she provided a list of all jurisdictions with Bates designations which was confirmed by the newly published *Wildland Fire Hazard Assessment* manual. With a confirmed list of agencies, the proper survey population was developed and efforts could now be made to develop a survey instrument.

Survey Instrument

Prior to beginning this task, interviews were performed with stakeholders who it was believed would be interested in such a project and might wish to collaborate in the development of the survey. These included: Rodger Ewers of the Teale Mapping Center on February 7th, 2000, Dana Cole, Division Chief and Fire Ecologist for CDF on February 23rd, 2000, and the author of the legislation, former State Assemblyman

Tom Bates on March 10, 2000. Based on the research questions and feedback from these individuals, the survey was developed in early March and mailed to all 107 fire agencies in the State with identified VHFHSZ's.

Data Tabulation and Literature Review

Once the surveys were returned, the data was gathered by response. After studying the data more closely, it was compiled and categorized into like sets and displayed in the Results Section.

In addition, a literary review was performed at the National Emergency Training Center's Learning Resource Center to specifically target literature regarding the WUI during and prior to attending the Executive Leadership Course from March 19-31, 2000.

Limitations

One limitation of this project was the difficulty encountered obtaining a valid list of those agencies that had identified VHFHSZ's from the State. Although inquiries to obtain this began in late 1999, it was not until early 2000, that one was obtained and confirmed.

In addition, because many respondents indicated their Bates measures had not been subject to fire situations, it could be concluded that most of the responses were the opinions of the individuals completing the surveys.

Definitions

CDF: The California Department of Forestry and Fire Protection, which not only coordinates the suppression of wildfires in SRA lands, contracts fire protection to over six counties, and oversees the State Fire Marshal's Office, and the State Fire Training Program.

Class A Roof: The most protective rating for a roof covering that is effective against severe fire test exposures as conducted pursuant to section 15.202.4.4.2 of the Uniform Building Code. Under such exposures, roof coverings of this class are not readily flammable, afford a moderate degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

General Plan: A legal document required by state law, which serves as a community's "constitution" for development and the use of its land. It must be a comprehensive, long-term document, detailing proposals for the physical development of the city, and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning.

Local Responsibility Area (LRA): An area in which local government has the primary responsibility for fire protection.

Office of Emergency Services (OES): A branch of the State Government that reports directly to the Governor and coordinates disasters and major incidents at a state-wide level.

State Responsibility Area (SRA): An area in which the California Department of Forestry and Fire Protection has the primary responsibility for fire protection for both structures and natural resources.

Urban-Wildland Interface (UWI): A popular term used to describe an area where various structures (most notably private homes) and other human developments meet or are intermingled with forest and other vegetative fuel types.

Vegetation Management: Various practices of clearing, thinning, or strategic placement of vegetation for the purpose of minimizing the rate of fire spread and intensity.

Very High Fire Hazard Severity Zone (VHFHSZ): Any geographic area designated pursuant to Government Code Section 51178 to contain the type and condition of vegetation, topography, weather, and structure density to increase the possibility of conflagration fires.

RESULTS

Of the 107 agencies that were distributed surveys, 39 (36%) completed and returned the document. These results then were organized around each research question.

Which Bates Measures have been tested in wildfire situations and found to be effective ?

Of the 39 surveys returned, the only Bates measures that was described by any agency as being truly effective was the vegetation clearance provision. However, despite this overall response, this one provision proved to be very common with 33 (86%) of the survey population responding positively.

What other wildfire protection measures or programs have been enacted locally and if tested in wildfire situations, found to be effective ?

While only one provision of the Bates Bill was found by the survey population to be effective, this research question solicited a variety of responses which were classified into the following five categories; Weed Abatement Programs, implementation of Automatic Aid Policies with neighboring agencies, the delivery of Public Education Programs, enactment of Class A Roofing Ordinances and, the implementation of Residential Fire Sprinkler Ordinances.

Weed Abatement Programs

Weed Abatement Programs were found to be used by 23 (59%) of the survey population. Most respondents indicated they utilized the abatement program outlined in

the California Government Code involving the following steps: inspection of, and the declaration of a public nuisance to exist on the property(s) by the local legislative body, the holding of a Public Hearing to allow owners the opportunity to protest the declaration, conducting re-inspections, performing forced abatement if necessary, billing the property owner(s) and attaching the costs on their tax bill if payment is delinquent.

Some of the reasons given for the popularity of the program included the ability of the fuel reduction to be performed to the satisfaction of the fire agency, the ability of a fire agency to recover most of their costs and the widespread support gained by taking the matter to the legislative body(s).

Automatic Aid Agreements

Automatic Aid agreements were another popular means found to be effective in fighting fires in Bates Zones. Of the 38 respondents, 16 (41%) identified them as an useful vehicle to dramatically increase the number of resources responding to an incident. Although most were based on written contracts that simply indicated all parties would respond as if the fire was reported in their own jurisdiction, some were more sophisticated, based on a Mutual Threat Zone (MTZ) concept. In the MTZ, a specific geographic area (such as a Bates Zone) was identified. Then, depending upon the weather conditions, dispatch levels and other conditions, a pre-designated response was established. Most also included related information such as communication frequencies, command structures and staging areas.

Public Education Programs

The use of programs that educated the public of the dangers of living in a VHFHSZ was another measure that was identified as being effective by the survey population. Out of the 38 respondents, 13 (34%) indicated they had implemented a variety of Public Education Programs including annual efforts at the beginning of fire season to heighten residents awareness, periodic mass mailings, the organization of neighborhood groups to help focus efforts in particularly vulnerable areas, and the creation of Fire Safe Councils comprised of homeowners, utility companies, the insurance industry and fire agencies.

Class A Roofs

The implementation of local ordinances requiring Class A roofs was one more regulatory program that was identified as having proven effective. In the Uniform Building Code, the fire resistance of roofing materials are broken down into Class A, B and C ratings with Class A, representing the most fire resistive (see definitions). Of the 38 respondents, 10 (26%) regarded a Class A roof requirement as an effective means to combat wildfires. Given the fire brands and embers that become airborne during a wildfire, the ability for a roof to resist ignition upon contact with these brands was found to be paramount, particularly in large conflagrations when they are found to cause fires miles ahead of the flame front.

Residential Fire Sprinkler Ordinances

The last measure that was cited as being effective was the enactment of Residential

Fire Sprinkler Ordinances. Although fire sprinkler systems have been used in structures since the before the 1900's, their use in residential construction is a fairly recent phenomenon dating back to the early 1980's. Based on the concept that a fire detected in its earliest stages will require a very small amount of water, residential sprinkler systems utilize quick response sprinkler heads and make use of a home's existing domestic water supply. Because of their ability to protect a structure with minimal fire department intervention, 3 respondents (8%) identified them as an effective fire protection program.

What measures identified would be most effective in mitigating the urban wildfire threat, given the Healdsburg Fire Department's limited resources?

To best answer this question, the six measures identified in the previous research questions were applied to the unique environment of the HFD. Based on these local conditions, the following conclusions were reached.

30' Vegetation Clearance & Weed Abatement Programs

Although the 30' vegetation clearance was the most common response cited by the survey population, implementation of this requirement would be problematic within the city limits. With the average residential parcel approximately 6000 square feet in size, obtaining a 30 foot clearance, without encroaching on to the adjoining property would not be possible in most cases. Compounding this problem is the reality that most current development is occurring in the VHFHSZ. As the price of land increases, it has resulted in a reduction of the average lot size, making this requirement more difficult to

implement in the very region where it is most needed. However, this regulation is enforced as much as can be done regardless of the lot size limitations when the HFD implements its Weed Abatement program each spring. Not unlike the programs cited by the survey population, the HFD Program uses the same procedures including the identical provisions of the California Government Code as its legal authority. Since the HFD program has been used for almost 20 years, the number of hours needed to run it is kept at a minimum, allowing it to remain fairly cost effective. Regardless, there were elements of other Weed Abatement programs that were found to be of benefit and could be used by the HFD to enhance their own.

Automatic Aid Agreements

One identified program that would prove effective for the HFD based on the survey results would be the development of Automatic Aid Agreements with neighboring departments. Not only were most agencies found to be receptive to this concept, due to the common threat created by VHFHSZ's, but the time and cost of developing and implementing the agreements was described as negligible. By realizing these benefits along with the availability of two nearby agencies willing to enter into such a contract, the HFD has already taken steps to implement this measure by drafting the Healdsburg Area Mutual Threat Zone Contract for future study (Appendix C).

Public Education Programs

Due to the great variety of Public Education Programs reported by the survey population, including several with demographics comparable to Healdsburg, there is a

high probability that one could be applied successfully by the HFD. For example, several respondents included with their surveys, samples of the brochures that are sent out annually to those residents in the VHFHSZ at minimal cost and effort to the agency. The improvement of existing literature, or development of new materials based on some of the examples supplied by the survey population could be easily implemented by the HFD at minimal cost and effort.

Class A Roofing & Residential Fire Sprinklers

Although a relatively small number of respondents identified these two measures as being effective in combating wildfires, as an agency that currently requires both in new construction, it validated our efforts and made it clear we have been focusing our prevention efforts in the right direction. Ironically, it was the occurrence of the East Bay Hills Firestorm that generated the public opinion needed to pass the Class A Roof Ordinance in 1992, which was the most progressive fire prevention measure implemented in Healdsburg since the adoption of the Residential Fire Sprinkler Ordinance in 1987.

DISCUSSION

Due to an apparent lack of literature available on the implementation and impact of the Bates Bill, it was difficult to draw any direct correlation between the study results and the findings of others. The most obvious relationship that was found to exist was a lack of specificity amongst the reviewed literature in comparison to the study results.

For example, in a majority of the wildfire prevention topics that were examined, most

of the discussion was expressed in general terms. One such example was found in the literature addressing vegetation management. Franklin (1990) indicated how flammable vegetation resulted in the spotting of wildfires several blocks ahead of the flame front and the entire conflagration jumping 200 foot fuel breaks. However, little comment were made on how to successfully mitigate the problem.

Similar findings were made regarding the use of Public Education (Pub-Ed) Programs. For example, Glenn (1997) commented how Function Area Support (or FAST) Teams brought “immediate results” when they implemented Pub-Ed Programs in the Lincoln National Forest, but did not provide any specifics on how these results were accomplished. In a description of Pub-Ed Programs in the southwest by Downing (1997), a rough outline of the program was included in the document, but did not get any more specific than providing such general statements as “Identify Innovative programs” and “Communicate these programs to other zone fire prevention specialists”. (p.11).

One exception was provided by Nelson (1999) who described the mechanics of the Weed Abatement Program in his jurisdiction and how its presence continued to successfully mitigating the threat of wildfire to structures.

Despite the existence of these generalities, one rather interesting correlation could be drawn from the concept of generalities and the public’s attitudes toward wildfire prevention. For example, Cook (1997) , Foote and Cole (1993) argued that the only way to truly solve the WUI problem was by changing attitudes. However, several agencies who responded to the survey indicated that when their jurisdictions were

identified with Bates Zones, the public had reacted negatively based on their fear of higher insurance premiums and the stigma of living in such an area be it in name only. Despite the best efforts of the fire agency to use the designation as a tool to educate the residents, and use the accompanying regulations to improve their fire safety, the public convinced the local legislative body to overturned the Bates designation. Naturally, this did nothing to minimize the fire hazard of the area, but rather eliminated the fire danger by public perception only.

I think it is critical that we as public safety agencies, do not discount the importance of the public's attitude, no matter how misguided it may be. As a result, before an agency begins any efforts in the WUI, it should make a careful study of the prevailing attitude of the population. Then, once an understanding is reached how to best deal with this mindset, a strategy can be developed to deliver an educational program.

The implications of this study for the HFD are mixed. With the presence of an existing Weed Abatement Program that has been conducted for almost twenty years, there is not only a historical acceptance, but almost an expectation by the public that those who live in the Bates Area will receive an inspection and notice to perform abatement activities. Conversely, with the recent growth that has occurred in Healdsburg, there has also been the emergence of an anti-growth alliance which has resulted in calls to leave much of the flammable wildland areas in their natural state, undisturbed by any abatement activities. If a dialogue is not begun with this faction to provide education and modify their attitudes, the department will face a serious challenge in its prevention efforts.

RECOMMENDATIONS

It is clear from the findings that there are several measures that are effective at minimizing WUI fire hazards, several of which would require minimal staff time if applied to the organization and are strongly recommended.

The first of these measures would be to begin a dialogue with the local open space district to permit the implement of a vegetation clearance (fire break) program along the boundary of the city limits. Whereas, a good deal of these lands are dedicated to open space and exempt to the requirements of the Bates Bill, successful negotiations would be essential to modify the tremendous fuel loads in these areas. Despite this challenge, the example set by the successful program in La Habra Heights would demonstrate how fuel reductions can be performed without sacrificing the environmental issues associated with open space preserves. These efforts, can also be assisted by taking advantage of existing regulations such as those that require prescribed clearances around utility poles. Using this very provision, a 75' fuel break was constructed along power lines in 1999 using inmate fire crew labor provided by the CDF as described earlier in this paper.

Another measure that was shown to be successful were the implementation of Weed Abatement Programs. However, since the HFD has had such a program in place for close to twenty years, it is recommended the department take advantage of its historical acceptance and continue the program, particularly in those areas in the VHFHSZ .

Several direct outcomes have occurred as a result of this study which the HFD

should pursue to their conclusions. First is the development of an automatic aid policy for the VHFHSZ. Currently, a draft agreement has been developed by the HFD, and is in the process of being reviewed by CDF, the adjacent Geyserville Fire District and the County of Sonoma (see Appendix C). Known as the Healdsburg Area Mutual Threat Zone (HAMTZ), it encompasses the entire Bates Area and has been so well received by neighboring agencies, it has been expanded to include their own jurisdictions. As indicated in the document, the VHFHSZ would be recognized a threat to all agencies and would result in an automatic response from all four departments, significantly enhancing our suppression capabilities. It should be noted that although in a draft form, as of this writing, these agencies have conducted a manipulative joint training exercise on the HAMTZ on July 23, 2000. It is recommended such training be conducted annually.

Another outcome of this study has been efforts to educate the public of the dangers of living in a VHFHSZ. Using examples of educational brochures provided by the survey population, a notice originally mailed to the VHFHSZ residents in 1995 has been improved and included in this paper (Appendix D). Upon approval of the Chief, it is recommended this brochure be mailed to the residents of the VHFHSZ annually.

A third outcome of this research has been to combine resources with the local fire safe council Fire Safe Sonoma (FSS) to pursue grant money to mitigate the WUI fire problem. Using the expertise of grant writing professionals and the stature of FSS, a grant has been prepared and submitted on behalf of FSS, the HFD, County of Sonoma and CDF to perform vegetation management in Healdsburg VHFHSZ (Appendix E). It is

recommended the HFD do everything it can to support this grant project and any similar efforts in the future.

Finally, because the HFD already possess regulations that require residential fire sprinklers and Class A roof assemblies on all new construction, it is recommended the department continue to enforce these measures and use every opportunity to educate the public and city council as to the benefits of these fire protection systems.

If this research topic is applied to another organization, it is recommended they devote their efforts towards gathering the information and statistics that illustrate the magnitude of the WUI problem, particularly in their own jurisdiction. Then, a concerted effort should be begun to educate their community and legislative body of the problem, taking care to include possible solutions.

One common denominator amongst the survey population was of those agencies that had successful WUI mitigation programs, also had in place some type of public education program. As stated by Fire Ecologist Dana Cole, “the public must understand that the fire service cannot mitigate the interface hazard alone. By the time the fire breaches the interface and crosses from wildland to urban fuels, it may be too late”. (p. 61).

REFERENCES

Bisbee, Mark. (1993, October). Keeping Pace with the Interface: Wildfire Preplanning. *Fire Chief.* Pg. 48-55

Bradley, Michael D. & Wheeler, Jim. (1997, April). Fuel Management in the I-Zone. *American Fire Journal.* Pg. 6-12.

Brown, Keith A. (1994). Wildland/Urban Interface Site Hazard Rating Pilot Project. (Executive Fire Officer Research Paper). Emmitsburg, MD. National Fire Academy.

Board of Fire Services. (1996, March). California Fire Plan. *State of California.*

California Department of Forestry and Fire Protection, (2000, March) CDF Homepage [on-line] Available: www.fire.ca.gov/1999fireseasonstats.asp

University of Califonia Forest Products Laboratory, (February, 2000). Wildland Fire Hazard Assessment. *State of California.*

Cook, Judith L. (1997, May). Homeowner Protection Efforts Can and Do Work. *Fire Management Notes.* Pg. 24-25.

Cowardin, David H. (1992, September). Wildland/Urban/Rural Structural Triage. *American Fire Journal.* Pg. 28-29

Downing, Judith. (1997, May). Prevention Reduces Losses During Southwest Fire Siege. *Fire Management Notes.* Pg. 10-13.

East Bay Hills Fire Operations Review Group, (1992). The East Bay Hills Fire. *State of California*.

Foote, Ethan I.D. & Cole, Dana. (1993, October). Hazard Mitigation at the Interface. *Fire Chief.* Pg. 56-61

Franklin, Scott E. (1990, April). Ornamental Shrubbery Poses Treat in Wildland/Urban Interface. *American Fire Journal.* Pg. 44-45

Gilbert, Gary W. (1995). Fire Protection in the Wildland/Urban Interface: Challenge fot the Future. (Executive Fire Officer Research Paper). Emmitsburg, MD. National Fire Academy.

Glenn, Merle. (1997, May). Teaming Up In the Wildland/Urban Interface. *Fire Management Notes.* Pg. 14-15.

Haworth, James O. (1989, October). LAFD Brush Clearance Program Helps Tame the Wildland/Urban Interface. *American Fire Journal.* Pg. 28-31

Lavin, Mary Jo. (1997, May). Managing Fire Risk to People, Structures, and the Environment. *Fire Management Notes.* Pg. 4-6.

Manning, Dick. (1990, May). Vegetation Management in the Wildland-Urban Interface *Fire Management Notes.* Pg 14-15

Nelson, B. (1999). Preparing Our Community for a Wildland Fire Disaster. (Executive Fire Officer Research Paper). Emmitsburg, MD. National Fire Academy.

O'Conner, Matt. (1998, Nov/December). Builder Beware. *NFPA Journal.* Pg. 47-53

Pumphrey, Lew. (1993, February). Wildfire Lessons Learned: Include Fire Protection in Growth Planning. *Wildfire News and Notes.* Pg. 10-11

Tunnell, Jeffrey. (1999, April). Ten Gallons of Prevention. *Fire Chief.* Pg. 52-55.

Wildfire Strikes Home Newsletter. (May 1988). The Wildland/Urban Interface Initiative in North Carolina. *National Fire Protection Association.*

Winston, Robert M. (1998, October). SWI Fire Protection At Grand Canyon National Park. *Firehouse.* Pg. 88-90

Appendices Not Included. Please visit the Learning Resource Center on the Web at http://www.lrc.fema.gov/ to learn how to obtain this report in its entirety through Interlibrary Loan.