TRIAGING THE WILDLAND INTERFACE PROBLEM IN THE MORAGA-ORINDA FIRE DISTRICT TO MAXIMIZE VEGETATION MANAGEMENT EFFORTS

EXECUTIVE PLANNING

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

ABSTRACT

This research project evaluated risk factors that impact the ability of fire suppression forces to quickly extinguish a wildland-interface fire before it spreads so that lives can be saved and property protected. The problem was that wildland-interface fires continue to pose a significant threat to human life, property and the environment. The purpose of this applied research paper was to determine to what extent the residential communities protected by the Moraga-Orinda Fire District were threatened by wildland-interface fires and whether the Moraga-Orinda fire District could mitigate that threat potential.

The research employed was both evaluative and action. The research was evaluative through the utilization of a community risk factor survey, the results of which were used to prioritize zone areas within the community from highest risk to lowest risk.

The research was action research in that the information gathered was applied in a real-world context through the implementation of a vegetation management program.

The research questions to be answered were:

1. What is the potential to the communities served by the Moraga-Orinda Fire District for wildland-interface fires?
2. What changes are required for the communities served by the Moraga-Orinda Fire District to mitigate the wildland-interface fire threat?
3. How should the Moraga-Orinda Fire District implement a fuel reduction program?

The principle procedure utilized a neighborhood risk factor survey to classify and prioritize neighborhood areas into zones based on vehicle access, topography, slope,

vegetation, predominant aspect, predominant fuel types, condition of vegetation relating to fire safety, roof and building construction, distance between structures, active homeowner groups, electrical services and average number of fires per 1,000 acres per ten years. This data was utilized to identify the highest risk areas for wildland-interface fires within the Moraga-Orinda Fire District to implement a vegetation reduction program.

The results indicated that there was a potential threat for a significant wildland – interface fire to the areas covered by the Moraga-Orinda Fire District; and that changes to reduce flammable vegetation fuels were necessary in order to mitigate that threat. The results also indicated that there were specific areas that posed a significantly higher risk with respect to a wildland-interface fires than others within the Morag-Orinda Fire District.

It was recommended to prioritize these areas so that fuel reduction would be completed, starting in the higher risk areas and followed by the lower risk areas through a systematic fuel reduction program.

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INTRODUCTION

The problem is that wildland-interface fires continue to pose a significant threat to human life, property and the environment. In California, communities have suffered the consequences of wildland-interface fires for decades. In the 1920's, there were 2 major fires in Northern California that destroyed 709 structures. During the 1930's, 28 lives were lost in 3 wildland-interface fires in Southern California. In the decades of the 1940's and 1950's major fires burned more than 300,000 acres and claimed 33 lives. The 60's saw 475,516 acres and 1065 structures burn along with 33 lives lost. Losses continued to rise through the 1970's when 790,435 acres burned, 1218 structures were destroyed and 24 people died. In the 1980's, 1,418,357 acres burned, 1,596 structures were lost and 19 people lost their lives (Corado, 1997). October 20, 1991 ranked as "one of the worst American fire disasters of the century" (Garcia, 1997). On that day, the Oakland Hills Fire raged through the east bay communities of Berkeley and Oakland claiming 25 lives, including a firefighter and police officer, and destroying over 3,000 homes.

The purpose of this applied research paper was to determine to what extent the residential communities protected by the Moraga-Orinda Fire District are threatened by wildland-interface fires and whether the Moraga-Orinda Fire District can mitigate that threat potential.

In this study the evaluative and action research methodology were used to answer the following questions:

1. What is the potential threat to the communities served by the Moraga-Orinda Fire District for wildland-interface fires?

2. What changes are required for the communities served by the Moraga-Orinda Fire District to mitigate the wildland-interface fire threat?

3. How should the Moraga-Orinda Fire District implement a fuel reduction program?

BACKGROUND AND SIGNIFICANCE

The community of Orinda, served by the Moraga-Orinda Fire District, has not been immune to the devastation of wildland-interface fires. On September 1, 1988, six homes were severely damaged, three were completely destroyed within 30 minutes as a fire ravaged up a hillside taking everything in its path. The Moraga-Orinda Fire District (MOFD) is located adjacent to and immediately east of the communities of Berkeley and Oakland and is susceptible to the same type of fire that occurred there. Over 90% of the City of Orinda has been designated by the State of California as a Very High Fire Hazard Severity Zone (VHFHSZ). The Town of Moraga has been designated in the Moderate Level of fire risk.

The MOFD was formed on July 1, 1997 when over 80% of the voters of Moraga and Orinda established a single comprehensive Fire District. A five-member Board elected by the residents governs the Fire District. The Fire District provides services for all emergencies including residential and commercial fire, medical emergencies, wildfires and other hazardous conditions. The service area is approximately 63 square miles and has a population base of 42,000. The vast majority of building occupancy consists of residential (98%), with approximately one-half of that (Orinda) located in a high risk, wildland-interface area.

In January of 1999, the District adopted a five-year strategic plan. The mission of the District is to provide the highest level of emergency and non-emergency service in response to the needs of the communities it serves (MOFD Five-Year Strategic Plan). A portion of the strategic plan addresses the goal for improved fire prevention activities. The Board of Directors approved a Fire Prevention Master Plan and included a section (Vegetation Hazard Program) to proactively address vegetation hazard mitigation. The goal of the Vegetation Hazard Mitigation Program is to obtain 100% compliance with state mandated vegetation management standards for all areas and parcels inspected in the District.

This applied research project seeks to address issues regarding wildland-interface within the MOFD and implementing an effective vegetation management program.

The Executive Fire Officer Program course on Executive Planning directly relates to this project. The vision of a fire safe community requires extensive planning. The MOFD strategic plan is the model that has been utilized for fulfilling this vision. The knowledge and skills learned through the Executive Planning curriculum have been useful in the planning process.

LITERATURE REVIEW

To better understand the wildland-interface problem in our modern society it is helpful to explore the relationship of wildfire and the human species effect on the existing fire cycles. Wildfire is nothing new. It has been an important process in forests, brush lands and grasslands in North America for tens of thousands of years. When the mass migration of tribes across the Americas resulted in the habitation with people who became later known as Native Americans, the natural fire cycle has ever since been changed. Some of the documented uses by the Native Americans included: protection of villages from wildfire, managing the habitat for game animals, clearing for agricultural purposes, helpful in the production of useful plant resources such as those used in basket weaving, and uses in hunting (Conard, et al., 1999).

With the European settlers came greater populations and a significant increase in land clearing for agricultural and other purposes such as logging. By the late 1800's human caused fires that destroyed huge areas of uncut forest and clearcuts reflected the devastating impact associated with these activities. America's first wildland-interface fire occurred in Wisconsin in 1871. The Peshtigo Fire claimed 1500 lives. Wildfire began to be viewed as a menace to society that needed to be controlled and suppressed whenever possible. The strategy of suppression continued into the 1900's and became this nation's preferred fire policy (Conard, et al., 1999).

California communities have experienced significant population and growth increases over the last several decades. This growth, in particular residential development, has extended into rural areas around our cities. Where the topography is flat and relatively open, little difficulty exists with respect to the wildland-interface problem. Many of California cities, however, are surrounded by steep, brush covered slopes. This encroachment has led to frequent loss of life and property due to fire (Gray, 1997).   The Bel Air Fire of 1961 burned 484 structures; a fire in San Diego in 1970 burned 382 structures and claimed 5 lives; the Panorama Fire, 1980, destroyed 325 homes and took 3 lives; in 1990 the College Hills Fire in Glendale and the Painted Cave Fire in Santa Barbara destroyed 660 structures, one life was lost.

The famous Oakland Hills Fire occurred in 1991. Dry Diablo winds gusting up to 60 miles per hour, vegetation that was parched from 5 years of drought set the stage for that catastrophic day. Temperatures were in the 90's, humidity was below 20%, and the wind was from the north east producing hot and dry conditions (Garcia, 1997).

The east bay hills, the venue for the Oakland Hills Fire, bears many historical similarities regarding the modification of the fuel environment to accommodate human activities. Once upon a time there were fields of oak trees that occupied most of the terrain. These indigenous trees were harvested as the population in the area grew and prospered in the late 1800's.

In place of the oak trees, local farmers planted millions of eucalyptus trees. The eucalyptus trees were thought to be fast growing, hardwood, perfect for use as railroad ties and furniture. This turned out not to be the case and as a result, they invaded and now are prevalent among the hillsides. Another anticipated use of the eucalyptus trees was to utilize them as wind breaks. Instead, the wind blew the seeds and further spread their growth (NFPA, 1992).

As people populated the hills they brought with them an assortment of vegetation, species such as junipers, cedars, and Monterey pine, all highly flammable. Chaparral and grasses are common to the area and highly flammable. Chaparral is commonly made up of chamise, toyon, greasewood, manzaneta, pine and oak. They are adapted to live in an area that receives little or no rainfall, or no rain for the majority of the year (Perry, 1978). All, except the grasses are high in resin content, can ignite readily and produce airborne embers. The eucalyptus and Monterey pines also have low hanging limbs that provide a laddering effect that allows lower lying fuels that have ignited to readily "climb the

Ladder" and ignite the crown of the tree. A significant number of these flammable fuels directly abut homes in the area setting the stage for a wildland-interface fire (NFPA, 1992).

The wildland-interface area is defined as the geographical area where structures and development meet wildland or hazardous vegetation. It is "where combustible homes meet combustible vegetation" (Gray, 1997). The critical issue is how to properly manage hazardous vegetation, whether indigenous or introduced, to reduce the potential for a wildland-interface fire.

To better picture the potential volatility of a wildland-interface fire, a single candle flame or a kitchen match equals one BTU (British Thermal Unit, the standard in the United States for measuring the energy of fuel burning). A cup of gasoline contains about 8,500 BTU's, the same as one pound of chaparral. If one were to spread the cup of gasoline across the floor of a room and ignite it, the reaction would be so volatile that it would approach an explosion. Ignite the one pound of chaparral with 30-plus mile per hour winds, low humidity and 80-plus degree temperatures and the same effect can be made (Franklin, 1996). On average, there is 6 to 8 tons of flammable vegetation per acre in the wildland-interface area of the MOFD.

Approximately 7 million Californians live in this described environment on hillside settlements or in new, rapidly growing communities within wildland areas. History tells us that these people are not only at risk of losing their homes, but their lives and the lives of their loved ones. It is no longer whether a matter of when a large fire will occur, but whether of degree and the significance of the loss (Gray, 1997). Ninety percent of the City of Orinda is located in the wildland-interface area described by the State of California as a Very High Fire Severity Zone (VHFSZ).

According to Gray, case studies indicated that the common factors that contributed to the losses in wildland-interface fires included: overgrown wildland and ornamental vegetation; lack of any defensible space between the structures and the hazardous vegetation; hillside development; high temperatures, strong winds and dry conditions; combustible wood roofs and building construction; insufficient access for emergency responders and evacuees; limited water supplies for firefighting; inadequate land use planning in hazard prone zones; vegetation management not adopted or enforced; lack of public information on interface fire safety (Gray, 1997).

Corado tells us that the principle factors that affect fire spread are weather, topography and fuel. The one thing that we as a society can control is fuel (Corado et al. 1999).

The problem that was evident in Oakland and Berkeley is similar to that which currently exists in Orinda, clearance of hazardous vegetation. The creation of safety zones, or fire breaks, around individual homes is a fundamental principle of residential fire protection in wildland-interface areas. Aggressive fuel reduction around the home not only helps in preventing fire spread from the wildland to the structure, but also from structure to structure. In the Oakland Hills area many of the residents did not avail themselves to this very basic and necessary precaution. The result was that as vegetation fuels ignited structures, massive embers from the structures were carried by the strong winds igniting further vegetation fuels and structures. The outcome was a macro fuel chain of ignition that led to the catastrophic destruction (NFPA, 1992).

During the aftermath of the fire, investigators found clear evidence of the benefit of fuel management and fuel reduction. Homes that had survived the fire were found back to back to homes that had been destroyed. The reason for this was that the combined backyard distance, when not filled with an overgrowth of combustible vegetation slowed the fire for a sufficient time that firefighters could be effective with their suppression efforts. In the Oakland Hills Fire a common factor for homes that survived was a large clear backyard (NFPA, 1992).

Following the Oakland Hills Fire, the California State Legislature enacted Assembly Bill 337 (Appendix A) in 1992, commonly referred to as “the Bates Bill” (Very High Fire Hazard Severity Zones Law, 1992). The Bates Bill establishes criteria for determining areas within the state of California that would pose a very high fire hazard and measures to be undertaken that would mitigate the rate of fire spread and potential for loss of life and/or property.

Vegetation clearance requirements mandated under the Bates Bill include:

- Maintain around and adjacent to any dwelling or structure a fire break, made by removing and cleaning away, for a distance not less than 30 feet on each side thereof or to the property line, whichever is nearer, all flammable vegetation or combustible growth.
- When extra hazardous conditions exist, allow for additional clearance up to 100 feet.
- Removal of limbs of trees that are within 10 feet of any outlet of any chimney or stovepipe.

- Maintain any tree adjacent to or overhanging any building free of dead or dying wood.
- Maintain the roof of any structure free of leaves, needles or other dead vegetation growth.
- Provide and maintain at all times a screen over the outlet of every chimney or stovepipe that is attached to any fireplace, stove or other device that burns any solid or liquid fuel.

Ninety percent of Orinda falls within the designation under AB 337 (Bates Bill) of a Very High fire Hazard Severity Zone (VHFHSZ) (Appendix B).

In addition to state mandates, federal legislation provides that under a presidential disaster declaration, the Disaster Relief and Reimbursement Act (Public Law 93-288) is implemented to provide for recovery, restoration and mitigation. The Act requires that following a disaster (i.e. the Oakland Hills Fire) a State must take actions (i.e. the Bates Bill) to reduce the potential for future urban/wildfire conflagrations. It further requires local jurisdictions to adopt goals and objectives outlined by the state. Failure of a local jurisdiction to develop a plan and implement it could be cause for future denial of state and federal assistance should the community experience a similar disaster in the future (Gray, 1997).

The literature indicates that wildland-interface fires can be destructive and even catastrophic in consequence. There are certain factors not within our control such as weather and topography that can contribute to the intensity and severity of a wildland-interface fire. Vegetation is a factor that can contribute to fire spread and intensity that is within our control. The literature indicates that removing hazardous flammable vegetation, whether natural or imported, can have a significant effect on mitigating the severity of fire spread and intensity. It is recommended and in the case of California, mandated that fuel reduction occurs in the wildland-interface areas. Orinda falls within that description and should therefor develop and implement a fuel reduction program.

PROCEDURES

Definition of Terms

Brush. A collective term that refers to strands of vegetation dominated by shrubby, woody plants or low-growing trees.

Chaparral. A highly flammable, seasonal plant community consisting of scrubs, trees and brush species found in the west and southwestern states.

Conflagration. A raging, destructive fire. Often used to describe a fire burning under extreme weather. The term is also used when a wildland fire burns into a wildland/urban interface, destroying many structures.

Defensible Space. The area within the perimeter of a parcel, development, neighborhood and community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfire or escaping structure fire.

Fire Hazard. A fuel complex defined by kind, arrangement, volume, condition and location that determines the degree of both ease and suppression difficulty.

Fuelbreak. A wide strip of land, strategically placed for fighting anticipated fires, where hazardous fuels have been replaced with less burnable fuels (like grass). They divide fire-prone areas into smaller parcels for easier fire control and provide access for firefighting.

Ladder Fuels. Fuels which provide vertical continuity between strata. Fire is able to carry from surface fuels into the crowns of trees or shrubs with relative ease and helps ensure initiation and continuation of crowning.

Very High Fire Hazard Severity Zone (VHFHSZ). Reflects the highest (most severe) fire hazard rating when assessing lands as they relate to fuel loading, weather and topography.

Wildland-Interface. The geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels. Synonymous with Urban/wildland interface.

Research Methodology

The desired outcome of this research was to encourage urban/wildland interface communities to become more proactive in urban wildfire prevention measures. The research was evaluative in that a survey of the area neighborhoods was performed through walking and observing objective criteria utilizing rating forms. Specifically with respect to the City of Orinda, the purpose was to develop a game plan for implementing a proactive fuel reduction program. Through the development of an Orinda Fire Rating Index, the MOFD prioritized the higher risk neighborhoods and created the basis to effectively manage fuel reduction efforts.

A risk factor criterion was developed for a survey of all neighborhoods in the Orinda area. The MOFD survey was adapted from the Montana Department of State Lands, with changes to address local requirements, circumstances and conditions (Montana Department of State Lands).

Risk factor information included the following:

- vehicle access (for emergency vehicles and resident evacuations)
- topography
- slope
- vegetation
- predominant aspect
- predominant fuel types (vegetation)
- condition of the vegetation relating to fire safety
- roof and building construction
- distance between structures
- water supply homeowner groups
- electrical services
- average number of fires per 1,000 acres per ten years

This information was gathered on a data collection form (Appendix C) and residential tally sheet (Appendix D), then assessed for its contribution to the wildland/urban interface fire risk and result in a risk index (Appendix E).

The Orinda area was divided into 8 zones so that each zone contained similar development with similar risk factors. The zones were large enough to include a representative portion of wildland fuels and topography within the adjacent development. The MOFD utilized local water district map designations for ease and consistency with potential water system improvements that were also being planned (Appendix F).

Two reserve firefighters from the MOFD and an intern student were assigned zone areas and were provided with data collection forms and tally sheets (Appendix C and D). These people walked each of the zones and gathered the survey information.

The information was used to compile and organize the data obtained during the field surveys for each zone and for use in developing the rating index (Appendix E). The rating form was used to quantify the zone data to obtain the rating classification and prioritization of low, moderate, and high. A low rating scored between 66 and 109 points; a moderate rating scored between 110 and 159 points; and a high rating scored between 160 and 210 points.

The zone ratings were a tool for the MOFD to use to set priorities and guidelines for the efficient use of funds and resources to address a significant and complex issue of vegetation management in the urban/wildland interface area.

Assumptions and Limitations

To maximize worker efficiency, the field workers would often times be required to work alone or in different pairs when conducting field data. A limitation of this process could be that different ratings could emerge depending upon who was out in the field on a particular day. For the purpose of this research it is assumed that all raters viewed the criteria similarly. To assist in minimizing this potential, each of the field raters received special training from the fire marshal.

RESULTS

Research Questions One and Two. Review of the literature makes it quite clear that a potential threat to the communities of Moraga and Orinda for wildland-interface fires is present, more specifically to the City of Orinda due to its designation as a Very High Hazard Fire Severity Zone. The close proximity of these communities to Oakland and Berkeley where the most destructive wildland-interface fire of this century occurred provides strong support to this position. Similarities in types of vegetation, building construction, road access, topography and weather support a warning that a fire of similar proportion could occur in these communities also.

The literature supports a finding that homes that provide a defensible space, clear of flammable vegetation, have a good chance to allow fire suppression to be effective in saving the structure and its occupants.

Research Question Three.

Using the information from the data collection form (Appendix D) and residential tally sheet (appendix E), each of the 8 zones was rated according to 10 categories as identified on the Rating Form (Appendix F). The total scores provided the overall zone risk rating. Each of the survey results and their corresponding rating form is attached (Appendix G). The results from the rating forms allowed the MOFD to prioritize areas so that resources could be assigned to the highest rated areas first to accomplish the goal of flammable vegetation reduction. The following Table 1 provides a summary of the 8 zones and prioritizes them starting with the highest risk area and ending with the lowest risk area.

Table 1 Zone Risk Scores and Property Totals

Zone Number	Total Properties per Zone	Total Properties Counted	*Rating/Score
1	698	546	High/162
2	703	696	Moderate/151
6	1092	1020	Moderate/141
7	563	496	Moderate/137
4	1329	1271	Moderate/135
5	302	277	Moderate/132
3	1028	1020	Moderate/130
8	917	909	Moderate/111

*Rating/Score: High=160 to 210, Moderate=110 to159, Low=66 to 109

Looking at the results from a broad perspective, of the 8 zones only one was designated as a high-risk priority. The other 7 zones were identified as moderate risk priorities.

However, when looking at the rating scores of fuel types, Zone 1 and 2 are significantly higher than the others followed by Zone 6. Zones 3, 4, 5 and 7 are all within close range of each other, followed by Zone 8 which is last. The following Table 2 provides a summary of the zone comparisons with respect to vegetation fuels only.

Table 2 Zone Risk Scores and Vegetation Fuels

Fuel Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
Short-needled timber								
Grass, scattered timber			10	10	10		10	10
Dense conifer		15				15		
Slash, bugkill, dense LPP	20							
% of homes that meet fire safe landscape								
76-100%								2
51-75%				4	4	4		
26-50%			6				6	
0-25%	9	9						
Totals	29	24	16	14	14	19	16	12

Whether one reviews all of the risk factors for fire hazards in the wildland-interface areas or looks specifically at the vegetation fuel factors from the survey, it appears that Zones 1, 2 and 6 are in the high priority classification; Zones 7, 4, 5 and 3 can be grouped in the middle for prioritization; and Zone 8 ranks lowest in terms of priority.

DISCUSSION

Research Question One and Two. Fire has been a part of a natural cycle for tens of thousands of years. Mans influence and subsequent interruption and manipulation of that natural cycle has been documented from the early Native Americans to the European settlers. The literature illustrates that fire has been a two-edged sword when the human species is a considered factor. Fire has been used to clear lands for agricultural and gaming purposes and the production of useful plant resources. When uncontrolled or in conjunction with man's ignorance, as demonstrated by introducing non-native flammable vegetation, the consequences have been catastrophic (Conard, et al., 1999).

Population and growth increases have exacerbated the problem and have magnified the losses, both of property and human life. This has been documented through fire statistics from the Peshtigo Fire in Wisconsin in 1871 when 1500 people lost their lives, to the Oakland Hills fire in 1991 resulting in over 3,000 structures and 25 lives lost (Conard, et al., 1999; Garcia, 1997).

The areas covered by the MOFD, and with greater concern the City of Orinda, relate to these findings. Population and growth increases, with approximately 6,000 people in the 1920's to over 18,000 today, and coupled with fuel modification from an indigenous grass and oak to a heavy fuel load that include eucalyptus, Monterey pine and juniper, Orinda quintessentially is what Gray describes as a vulnerable situation. "It is no longer a matter of when a large fire will occur, but whether of degree and the significance of the loss" (Gray, 1997).

The implications of the current situation are that the community must reduce its flammable vegetation and the MOFD organization must support that objective through an aggressive fuel reduction program. If this does not occur then the communities served by the MOFD run the risk of a fire similar to that experienced by Oakland and Berkeley.

Research Question Three. The literature strongly supports the need for vegetation management. Defensible space, control of fuel, aggressive fuel reduction, clearance of hazardous vegetation, were familiar terms from the literature that describe a fundamental principle of residential fire protection in the wildland-interface area (Gray, 1997; Corado et al., 1999; NFPA, 1992). What the literature doesn't explain is how a community with a significant amount of flammable vegetation and limited resources commences the complex process of implementing a fuel reduction program.

The risk assessment survey conducted by the MOFD is a systematic approach to this issue. There is a commonly known saying that has been heard when a job appears too large to manage. The saying starts by asking "How do you eat an elephant"? the answer of course is "by taking one bite at a time". This is the approach that has been chosen by the MOFD.

The survey allowed the Orinda area to be broken up into manageable components, each rated according to a fire risk index. The overall objective of the MOFD five-year strategic plan is to have 100% compliance with weed abatement and Bates Bill requirements. A systematic approach will help the MOFD achieve this mission. The highest fire risk area will be abated of hazardous vegetation first followed by the next highest risk area until the lowest fire risk area is completed.

There is currently no nationally recognized wildland/urban interface fire assessment criteria or methodology for a risk rating system. The system utilized by the MOFD allowed the it to collect expanded information that is critical to evaluating fire prevention issues. In addition to vegetation issues, the MOFD was also able to collect valuable information regarding other fire prevention issues such as road access and water supply.

It is important to remember that wildland fires have no boundaries. The Oakland Hills Fire of 1991 graphically illustrated this point. Burning flying embers traveled over miles, starting fires in other neighborhoods. Vegetation mitigation within the zones plays a critical part in containing fires to smaller areas. When fire spreads, the pre-removal of dead or dying vegetation reduces the fuel load and the contribution to fire spread into other neighborhoods.

The fire risk assessment was an essential “step” in achieving the final result of a community wide Vegetation Hazard Mitigation Program. With the community areas rated in terms of priorities, the MOFD can now commence implementation of abatement of hazardous vegetation, reducing the risk to these local areas and to the entire communities served by the District.

RECOMMENDATIONS

It is recommended that the MOFD hire 6 total seasonal reserve firefighters , with 4 assigned to Orinda and 2 to Moraga, for the duration of the fire season commencing in June of 2002 through September 2002. In meeting with the fire marshal and reviewing area priorities it was determined that 6 people working 8 hours a day for that duration would be able to inspect and oversee abatement of 100% of the residences in the MOFD.

Utilizing the risk survey and prioritization recommendations, the highest risk areas in the District will be abated early in the season when actual risk for significant wildland-interface fires is at its lowest. The lower priority areas will be completed later in the season when fire dangers are higher. This way, the zone that posses the greatest risk is completed well in advance of when weather would have its greatest impact. It should be reiterated that it is during the months of September and October that the dry, hot and gusty, offshore winds occur along with the pre-drying and lowering of the fuel moisture in the vegetation. These are the most dangerous months for wildland-interface fires. The goal of 100% compliance will be completed before the most critical month of October arrives.

It is further recommended that the MOFD establish the necessary databases for record keeping, track and evaluate the results of this first year program. It may be necessary to modify the program, depending on the results actually achieved.

The true test of the program will be during the heightened fire season. Should a significant wildland-interface fire occur, if citizens are able to safely escape without injury or loss of life, and fire suppression forces are able to aggressively set up operations and control the fire before it has time to spread, then the fuel reduction program will have proven truly successful.

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