JOSEPHINE COUNTY INTEGRATED FIRE PLAN LESSONS LEARNED: WILDFIRE RISK ASSESSMENT

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Introduction

On November 8th, 2004, after approximately 16 months of plan preparation, collaboration, and writing, the Josephine County (OR) Board of County Commissioners adopted the Josephine County Integrated Fire Plan (JCIFP). An integral component of this plan is the countywide risk assessment developed by members of the JCIFP Risk Assessment Committee. Understanding the risk of potential losses of life, property, and natural resources due to wildfire is essential to developing a useful and comprehensive community wildfire protection plan (CWPP). Risk assessments identify the likelihood of a wildfire starting, the severity of a potential conflagration, the human and natural values threatened by wildfire, and the abilities of communities to protect those elements. This paper evaluates the JCIFP risk assessment process using information gathered from interviews conducted in February and March 2005 with members of the Risk Assessment Committee. This report is intended to assist other communities in developing wildfire risk assessments by shedding light on the Josephine County experience, as well as provide Josephine County with lessons learned that can be applied to the implementation of the fire plan and monitoring of the risk assessment over time.

The paper provides an overview of the relevant policies, factors and events that have led to the development of the JCIFP. Section Two provides important definitions, a detailed methodology, and the results obtained. Section Three reports on the successes and challenges of the risk assessment and collaborative process perceived by members of the Risk Assessment Committee. The final section discusses conclusions and future implications for the risk assessment as it has been carried out in Josephine County, as well as opportunities this experience may have for other communities developing fire plans.

Policy

In response to the destructive and costly fires that have impacted the nation over the past ten years, particularly in the west, legislators and the White House have put increased emphasis on community wildfire protection plans. The Healthy Forest Restoration Act of 2003provides guidance for CWPPs that identify and prioritize hazardous fuels treatment projects. Wildfire planning provisions have not been limited only to local communities. In 1995, the Federal Wildland Fire Policy was enacted to establish a unified and cohesive federal fire management policy that recognizes the ecological threat of excessive fuels loads and calls for a proactive approach to protecting natural systems from uncharacteristic wildland fire. Under this policy, federal agencies across the country have recently completed (or are in the process of completing) federal fire management plans. In September of 2004, for example, the Forest Service, Bureau of Land Management and the Oregon Department of Forestry completed Phase I of the Southwest Oregon Fire Management Plan, which provides an integrated concept in coordinated wildland fire planning and protection among Federal, State and local government entities.

At the state level, the Committee on Agriculture and Natural Resources, at the request of the Oregon Department of Forestry (ODF) and the Oregon Office of the State Fire Marshal, sponsored the Oregon Forestland-Urban Interface Fire Protection Act of 1997 (Senate Bill 360). The forestland-urban interface or "wildland-urban interface" (WUI) is defined as the area or zone where structures and other human development meet to intermingle with undeveloped wildlands or

vegetative fuel.[1] The purpose of SB 360 is to provide a coordinated wildfire protection system within Oregon's WUI areas that effectively protects values at risk while minimizing cost and risk. SB 360 is intended to promote property owner efforts to minimize and mitigate fire hazards and risks within the wildland-urban interface. By the end of 2004, SB 360 had been implemented in Jackson and Deschutes Counties. Josephine County recognized the need to be consistent with state level policy and addressed the intent of SB 360 through the development of the JCIFP.

Genesis of the JCIFP and Risk Assessment

In 2002, the Biscuit Fire burned nearly 500,000 acres in southwestern Oregon. This event prompted Josephine County officials to pursue a thorough assessment of wildfire risk to their communities. Initially, county officials considered acquiring state-of-the-art satellite information on fuel loading throughout the county. Officials soon recognized, however, that completing a comprehensive countywide fire plan using existing data would be more cost-effective and would provide direction for the kind of data or imagery most needed in the future. Josephine County contracted with Resource Innovations (formerly the Program for Watershed and Community Health) to facilitate development of the fire plan in August of 2003.

In June of 2003, the National Association of State Foresters (NASF) had instructed states to develop statewide risk assessments to identify and prioritize communities most at risk of wildfire. The NASF, through a memorandum of understanding with the Forest Service and the Bureau of Land Management was assigned to maintain a list of communities-at-risk. The NASF set four criteria for creating these assessments: 1) Hazard, 2) Risk, 3) Values, and 4) Protection Capability. The criteria allow for some flexibility between rating classifications, taking into account specific parameters that each state might have already in place. Josephine County and ODF added a fifth layer, structural vulnerability, to the assessment as discussed later in this report.

The Oregon Department of Forestry, guided by Jim Wolf, State Fire Program Analyst, took a strong interest in the Josephine County plan, and particularly the risk assessment. They saw promise for developing a risk assessment methodology that met the NASF need for identifying and prioritizing communities-at-risk, as well as implementing the risk assessment element of SB 360.

ODF recognized that by establishing a methodology through the Josephine County plan, other communities in Oregon could develop their own risk assessments, and provide a level of consistency across the state. Partners also believed testing the methodology in Josephine County would help expose the shortcomings of available risk assessment data, as well as the challenges to understanding risk and identifying opportunities for various levels of treatment.

JCIFP Organizational Structure

In the early stages of plan development, Josephine County formed an Executive Committee to provide guidance and oversight to the planning process and ensure that the plan met state and federal policy objectives. The County also formed committees to address Risk Assessment, Fuels

[1] Forest Ecosystem Restoration Analysis webpage: http://jan.ucc.nau.edu/~fera-p/glossary.htm

Reduction, Education and Outreach, Emergency Management and Citizens with Special Needs.[2] We provide a description of each of the committees in the table below.

Table 1: JCIFP Committees and Their Objectives

Committee	Objectives
Executive Committee	· Provide oversight to all activities related to the JCIFP. · Ensure representation on and coordination between the sub-committees · Develop and refine goals for fire protection in Josephine County · Develop a long-term structure for sustaining efforts of the JCIFP
Risk Assessment	· **Identify Communities-at-Risk and the Wildland-Urban Interface** · **Develop and conduct a wildfire risk assessment** · **Identify and prioritize hazardous fuels treatment projects**
Fuels Reduction	· Identify strategies for coordinating fuels treatment projects at a landscape scale · Administer grants for fuels reduction equitably across fire districts. · Provide special need citizens with an opportunity to participate in programs · Identify opportunities for biomass marketing and utilization
Emergency Management	· Strengthen emergency management, response and evacuation · Build relationships between County government and local fire districts
Education and Outreach	· Develop strategies for increasing citizen awareness and action for fire prevention · Reach out to all citizens in the county

The risk assessment committee consisted of representatives from the Bureau of Land Management, the U.S. Forest Service, ODF, and local fire districts and a community-based organization. Collaboration with federal agencies was essential since the Healthy Forests Restoration Act directs 50% of spending on hazardous fuels treatment to occur within the WUI. The Southwest Oregon Fire Management Plan identifies the WUI on the basis of proximity between private and federal lands, topography, and 6th field watersheds. The Josephine County Integrated Fire Plan adopted the Southwest Oregon Fire Management Plan definition of the WUI for the JCIFP. The risk assessment and fuels reduction committeesbegan meeting in October of 2003.

Defining Communities-at-Risk

The first step that the JCIFP risk assessment committee undertook to identify communities-at-risk focused on defining "community." State and federal guidance provides a range of alternatives, from "a group of people living in the same locality and under the same government" (NASF) to "a body of people living in one place or district...and considered as a whole" or "a group of people living together and having interests, work, etc. in common" (Firewise Communities/USA).

There are many ways to define community, particularly in Josephine County. There are cities, towns, neighborhoods and groups of people drawn together by common threads such as their post office, grocery store, or community center. The fire plan draws people together in another way – the ability to provide fire protection services and protect people, property and natural resources in the event of

[2] Note: the Emergency Management Committee took over responsibilities of the Executive Committee in January 2005

a structural or wildland fire. The JCIFP risk assessment committee agreed to define communities at risk to fire by looking at the common service boundaries for fire protection.

The JCIFP process for identifying communities-at-risk is as follows:

1. Residential density based on 1 structure per 40 acres with a minimum of 4 residences and ¼ mile buffer; and
2. Fire District or Municipal service boundaries. (In Josephine County, there are six fire service agencies that provide structural fire protection.)
3. In areas where there is no fire district or municipality (such as the unprotected areas serviced by Rural/Metro Fire Department), communities are listed as "Josephine County Unprotected."[3]

While a number of Josephine County's communities are listed as "unprotected," these communities are not without structural fire protection. Rural/Metro Fire Department and Grants Pass Rural provide contract structural fire protection services throughout the Josephine County unprotected area. However, these communities are not within a taxing fire district, which may have other implications in the event of a conflagration. Communities at risk in Josephine County include:

- Applegate Valley (Provolt and Murphy)
- Grants Pass
- Grants Pass Unprotected
- Josephine County Unprotected
- Illinois Valley
- Williams
- Wolf Creek
- Oregon Caves

[3] In order to attribute place names to isolated communities not connected by the 1 per 40-acre density, the plan uses the Oregon Land Conservation and Development Commission definition for rural communities: an unincorporated community which consists primarily of permanent residential dwellings but also has at least two other land uses that provide commercial, industrial, or public uses (including but not limited to schools, churches, grange halls, post offices) to the community, the surrounding rural area, or to persons traveling through the area.

SECTION II: RISK ASSESSMENT METHODOLOGY

The Josephine County risk assessment is based on an extensive literature review of many different methods developed over the years to evaluate wildfire and other natural hazards. The assessment is intended as a qualitative tool to illustrate a comparative level of risk to life, property and natural resources within any area in the county. As fuels reduction, emergency management and fire prevention projects are implemented through the JCIFP, the maps and priorities developed through the assessment will change, but they will always point to areas identified as having the highest relative ranking for risk and hazard. The assessment considers five categories in determining the relative severity of fire risk:

Layers	Elements and Possible Scores	Data Source	Total Score
1. Hazard	• Vegetation (0-20) • Crown Fire Potential (0-10) • Slope (0-3) • Aspect (0-5) • Elevation (0-2) • Weather (0-40)	IVMP, WODIP; USGS Elevation Models; UGB Boundaries, Aerial Photography	0-80
2. Risk	• Fire Ignition Density (5-40)	ODF Database	5-40
3. Values	• Residential Density (0-40) • Community Values (Weighted)	Tax Assessor, Aerial Photography; Public Meetings	0-40
4. Protection Capability	• Community Education Component (0-4) • Areas outside a fire district w/ wildfire response >20 minutes (36) • Areas outside a fire district w/ wildfire response <20 mins (15) • Areas inside a fire district w/ structural response >10 mins (8) • Areas inside a fire district w/ structural response <10 mins (0)	Spatial Analyst, Fire District Boundaries, Community Classes	0-40
5. Structural Vulnerability	• Roof type (0-30) • Defensible space (0-30) • Access (0-30)	Tax Assessor, ODF database, County GIS	0-90

The first four categories illustrated in the table above are described in the NASF guidance for identifying and prioritizing communities-at-risk. At the beginning of the planning process, the risk committee agreed on the fifth category, structural vulnerability, based upon two important factors: 1) Research by Jack Cohen at the National Interagency Fire Center suggests that approximately 80% of the reasons homes ignite in wildfires has something to do with things that landowners can improve on their property, and 2) Josephine County had significant data on roof structure, access routes and defensible space through tax assessor information and ODF data on defensible space. ODF had a strong desire to include this additional layer as part of the statewide assessment process.

This following section of the report provides a description of each layer, the available data and the weighting system used in the overall assessment.

Hazard

Hazard, the characterization of elements contributing to wildfire conditions, is based on vegetation, topography, weather, and land use. The vegetation information combines 1996 Interagency Vegetation Mapping Project (IVMP) dataset supplied by the BLM with Western Oregon Digital Imagery Project (WODIP) data. The topographic information (elevation, slope, aspect) is based on 10-meter USGS digital elevation models, also supplied by the BLM. The land use characteristics come from UGB boundaries and aerial photography interpretation. **The combined elements of this layer have values ranging from 0 to 80.**

Vegetation information describes the percent vegetation cover broken into coniferous and broadleaf categories. The initial vegetation information is broken into classes at 30 and 70 percent cover, with the least vegetation being the least hazardous and the most vegetation being the most hazardous. Areas mapped as other than vegetation, for example "snow" or "shadow", are included in the lowest hazard class. These represent an extremely small area.

Crown Fire Potential is produced by isolating areas with coniferous trees with trunk sizes over 5 inches in diameter at breast height (DBH). These areas are then split into three classes; conifer cover over 70 percent is the most hazardous, conifer cover over 30 percent has some hazard, and conifer cover less than 30 percent has no crown fire potential.

Topographic Characteristics are slope, aspect and elevation. Slopes are in three classes broken at 25 and 40 percent slope values *(note: percent slope is quite different from degree slope and many GIS packages default to degree slope)*. The slope layer has values ranging from 0 (least slope) to 3 (most slope). Aspect is also broken into three classes. These range from 0 (north) to 5 (south). This corresponds roughly to the amount of insolation or sun exposure expected on the site. Finally, elevation values are broken at 3000 and 5000 ft. Lower elevations are considered more hazardous. This layer ranges in value from 0 to 2.

Weather is the most important factor in the hazard layer, accounting for 40 points. Weather information came from the SB 360 classification system developed in 1993. This information is broken into three zones across the state based upon severe fire weather days. In Josephine County, this factor does not change across the county. However, some areas, such as irrigated pastures, are simply unlikely to burn regardless of the weather. Two "Mask" layers were created to isolate areas where weather is not a significant factor. The agriculture mask was produced using the overlap from the IVMP "agriculture" class and a layer digitized from aerial photography. The urban mask was created using the overlap of the IVMP "urban" class and the urban growth boundaries for the incorporated cities in Josephine County.

Risk

Risk, the likelihood of a fire occurring, is modeled from the density of historic fire ignitions. The data is derived from an ODF database with 35 years of data on fire ignition locations. However, the layer only uses the last 20 years in the database. Though Josephine County used only ODF data in this historic occurrence assessment, the State of Oregon generally combines Forest Service and BLM data with ODF data. The JCIFP risk assessment committee had enough confidence in the ODF data for southern Oregon to include only that layer. The 20-year history increases the areas illustrated as higher risk compared to the 35-year database and better reflects present settlement and use patterns. The density layer is multiplied by 1000 (acres converted to 1000 acres) and divided by 2

(20 years of fires to 10 yrs) to standardize it to units of fires per 1000 acres per 10 years. The break points are 0.5 and 10 ignitions/1000 ac./10 yr. **This layer has values ranging from 5 to 40.**

Values

The values layer, the human and economic values associated with communities or landscapes at risk, is based on the density of residences. The assessment uses the Josephine County Assessment and Taxation database in conjunction with tax lots and building footprints to create an address point layer. This layer has a point for each address located on the appropriate building footprint (where available). The County used aerial photography to pinpoint the actual location of building on individual properties. The density of residences is then used to create the values layer. The classes correspond to 2 acre and 10-acre average lot sizes (as used in S.B 360). **This layer has values ranging from 0 to 40.**

There are many other social, ecological and cultural values not reflected in this layer. Additional values can be considered by gaining community input on historic, environmental, cultural and other values. Community input can be factored in as an increase in score or included as an overlay to the initial assessment and used in making decisions about priorities for treatment. Other values include:

- Businesses/Commercial
- Ecologically Sensitive Areas/ Ecosystem Health
- Wildlife/Habitat/Plants/Water and Watersheds
- Air Quality
- Natural Resource Management Areas: Range, Timber, Agriculture
- Tourism, recreation and cultural resources
- Access, transportation and infrastructure (Roads, Driveways, Bridges, Gates, Culverts)
- Water Availability, Supply Hydrants: Map of Locations, Flows, How Often Checked
- Critical facilities and infrastructure
- Cultural resources
- Environmental resources

Protection Capability

Protection Capability includes the capacity and resources to undertake fire protection measures. This layer includes structural and wildland firefighter response times, community education programs, and whether or not a site is in a fire protection district.

Structural response times were modeled using the cost/allocation features of Spatial Analyst in Arc GIS and factored in fire station locations. Josephine County GIS created a grid of the transportation network using variable cell values based on estimated speeds. For example, Highway 199 was modeled for an average speed of 55 mph while minor roads were modeled for an average speed of 35 mph. 300 feet also buffered the transport network. This is the area a firefighter could lay-in hose off their truck. The buffer area was modeled for an average speed of 3 mph. Fire Stations were used as source points and the cost/allocation algorithms found the least cost path from each cell to the nearest (in terms of cost) fire station. This yielded the estimated structural response times.

The assessment models wildland response times using an ODF database of fire ignitions and the actual response time to each ignition. A surface was created from the response times, and then classed into response times under 20 minutes and over 20 minutes. Fire District boundaries are determined using historic assessment documents that created each taxing district and its subsequent annexations. The Assessment and Taxation database stores this information for each tax lot. The

Community education programs layer is currently assumed to be the same for all of Josephine County as the JCIFP addresses mitigation and community education countywide. **This layer has values ranging from 0-40.** The scoring for this layer is as follows:

- All areas receive 2 points for the community education component (0-4 possible)
- Areas outside of a fire district with wildland response over 20 minutes receive 36 points
- Areas outside of a fire district with wildland response under 20 minutes receive 15 points
- Areas inside a fire district with structural response over 10 minutes receive 8 points
- Areas inside a fire district with structural response under 10 minutes receive 0 points

Structural Vulnerability

Structural Vulnerability, the likelihood that structures will be affected by wildfire, is based on characteristics of individual residences. There are three parts to structural vulnerability: access, roof type, and defensible space. Each residence is evaluated on these three factors and given a score. This layer is then created from the residence locations. Areas under a critical density threshold are excluded for the creation of the surface. Otherwise isolated homes exert too great of an influence on the assessment. **This layer has values ranging from 0 to 90.**

Roof type is determined by the County's Assessment and Taxation database. All shake shingle roofs are given a score of 30; others get a score of 0.

Access is determined by proximity to a road that is not a dead end. This information takes into account digital information on driveways gathered from aerial photography. Those residences located on dead-end roads or outside of a 300-foot buffer of other roads are given a score of 30; others receive a score of 0.

Defensible Space is tracked from an ODF database of homes that have received grants or evaluations from ODF dating back to 1997. These homes were rated by ODF staff through on-site visits. Those receiving a "green" rating from ODF get a score of 0; others receive 30 points.

Using the Risk Assessment Data

For each layer, Josephine County GIS created a map that reflects the respective data across the county. Josephine County GIS combined the different layers to produce a single map that captured the overall risk, based on the five categories, as it was determined across the county. The final Wildfire Risk Assessment yields values that are the end result of analyzing over 20 layers of GIS information. The assessment condenses this information into one numeric value to identify comparative areas of risk. The initial approach assigned values to individual tax lots and focused on those with the highest values as potential priorities for mitigation projects. However, acknowledging the imperfections in the data and the inherent problems in trying to characterize small, precisely defined areas (tax lots) with landscape level data, resulted in recognition that a different approach was needed.

Identifying and Prioritizing Fuels Treatment Projects

One of the primary objectives of a Community Wildfire Protection Plan is to identify and prioritize hazardous fuels treatment projects. One of the primary means of accomplishing this is by looking at the high hazard areas identified through the wildfire risk assessment. Given the limitation of the

technical data, however, partners did not feel that priority projects could be identified through the risk assessment alone. The hazardous fuels treatment priorities identified through the Josephine County Integrated Fire Plan are based on three factors: the risk assessment, local knowledge and community input obtained at public meetings held throughout the county in 2004 and 2005.

The technical risk assessment provides a baseline of knowledge about hazard, risk, values, protection capability and structural vulnerability. The maps also allow partners the opportunity to navigate through the different layers to better understand why a certain area comes up as high risk and the opportunity to identify strategies to reduce wildfire risk. The technical information, combined with local knowledge and community values, is providing a basis for prioritizing hazardous fuels treatment and specifying the type of action that should occur (e.g., defensible space, evacuation routes, landscape treatment, etc.)

Josephine County GIS developed maps to illustrate the hazard and risk assessment values along with topography, ownership, transportation routes, planned and completed fuels reduction projects, and residence locations. This information is allowing partners (including fire districts) to examine many variables that may not be included in the assessment and examine high-risk areas and their relationship to the overall landscape. This process will also allow federal and state land managers the opportunity to develop landscape level strategies to reduce fire risk levels as they plan fuel hazard reduction project. One of the most important findings from this process is the recognition that identifying priorities for fuels reduction is an on-going and iterative process. As better data is made available and the landscape changes, partners can work together to review, update and identify new priorities.

Scale

The scale of fuels treatment projects should support coordinated protection efforts and focus on restoring ecosystems to more closely resemble historic conditions. To assess the areas of concern and prioritize them for treatment with highly competitive fuels dollars, the need for accurate data on the existing vegetation is essential. The risk assessment committee used the following terminology to describe project scale:

> **Local Scale**: refers to defensible space projects within fairly close proximity to a structure.
>
> **Tactical Scale**: refers to treatments on ridgelines, in drainage bottoms, or along roads which might serve to slow a fire's spread, reduce its behavior, provide ingress/egress, or provide defensive positioning by suppression forces on the side of the protection area with predominate wind or slope concern.
>
> **Strategic Scale**: refers to treatment areas further out from the tactical ground around protection areas that could provide all the features listed above, but would focus on reducing fire spread and behavior to reduce impacts and effects once the tactical zone is approached.

SECTION III: EVALUATING THE METHODOLOGY

The technical aspects of the risk assessment posed significant challenges to the committee, given the nature, age, or perceived accuracy of the data. Once data was configured to the committee's needs, they faced additional questions about how to weight individual factors. In interviews, committee members reflected on the temptation and ease of relying on technology to provide answers, but also recognized the limitations of the data and modeling, and the need to educate the users on the limitations. This section examines the challenges within each layer of the risk assessment and concludes with a discussion of the limitations associated with rating the layers and the scale by which the risk assessment is used.

Hazard

Committee members repeatedly cited out-dated vegetation information within the hazard layer as the assessment's biggest weakness. The committee primarily used Interagency Vegetation Mapping Project (IVMP) data derived from remote sensing sources and on-the-ground data collection to form the vegetation layer. Despite its 30-meter resolution, committee members acknowledged several deficiencies within the data, including its specificity, continuity and age.

As is true with many vegetation surveys conducted in the western US over the last decade, IVMP data does not specifically capture information directly related to fuels mapping (e.g. the amount of dead fuel, the amount and distribution of ladder fuels, crown bulk density, crown base-height, etc.). Some committee members also point out that the data loses its precision at the tax lot level. Also, though IVMP data is expressed in continuous form, it does not have full coverage throughout Josephine County. This forced the County GIS technician who processed most of the technical data to write a macro incorporating less-reliable Western Oregon Digital Image Project (WODIP) data in order to create one continuous layer.

Another drawback of the vegetation data is its age. IVMP data is from 1996 and committee members believe that it does not accurately portray the changes that have occurred on the landscape since that date. For instance, the data does not capture major and minor fire occurrences (including the approximately 500,000 acres burned in the Biscuit Fire), or fuels treatments in the area, and consequently, the raw Hazard layer data does not account for these ground disturbances. Although the Forest Service and BLM record their current and planned fuels reduction projects, there is concern about the reliability of that information due to inconsistencies in how data is tracked and reported. According to County GIS, BLM information captures the actual locations of thinning projects throughout the county, whereas Forest Service information only provides generalized quadrants of where projects are slated to take place, making it difficult to pinpoint actual vegetation change. In April 2005, Josephine County sent a letter to both agencies requesting standardization of data inclusive of project boundaries, common definitions, and common descriptions for measuring the effectiveness of the treatment. Currently, information on fuels treatments is used only as an overlay for fuels reduction planning, as opposed to a factor considered in the actual risk assessment

Despite these concerns, committee members decided that the IVMP data and WODIP supplementation constitute "Best Available Data," a term used in determining how an assessment should be done using limited resources in the most effective way. By augmenting the vegetation data with slopes, aspects, and elevation data, the committee felt it was able to capture the broad outlines of the hazards in the county. Still, most committee members agreed that the fuels information must be examined critically and considered an *indicator,* as opposed to *fact*—especially at the small-scale

risk assessment committee. In 2004, Josephine County submitted a National Fire Plan grant application to update vegetation information in Jackson and Josephine Counties through more reliable satellite imagery. Josephine County received notice that the grant will be awarded from the National Fire Plan office and is expected to begin its implementation in the summer of 2005. This local work will support a national program aimed at creating fuel hazard maps for the entire country.

Risk

Josephine County modeled risk from the density of historic fire ignitions. According to ODF, in a statewide assessment, all of the populated areas of Josephine County would be considered in the highest risk class. However, for this information to be useful in Josephine County it must illustrate the relative levels of risk throughout the county. The County adjusted class values to allow variation from the highest to lowest classes across the county. It is important to note that the lowest class does not mean that these areas are at "low risk" to wildfire.

The ignition data used in this part of the assessment does not include data from municipal agencies. The committee assumed that municipal data was not reliable due to inconsistencies in reporting between various fire districts. Fire Districts generally report fires to the State Fire Marshal. However, some districts are more consistent with recording information. Despite any gaps, a few members of the risk committee expressed concern that the assessment still double-counted historical fire ignitions and population density. One committee member also commented that the ignition data did not line up with what some of the people with on-the-ground experience had "in their guts," potentially raising questions about the accuracy of the fire ignition data.

Values

Committee members expressed confidence in the residential data used for life and property from the County tax assessor's office that made up this layer. Recognizing that this data is limited to life and property, the County facilitated a series of community meetings to gather local knowledge about additional community values. The County held meetings at local fire districts where residents had the opportunity to identify other economic, environmental, social and cultural values and resources they most wanted to see protected from wildfire.

Some committee members resisted incorporating the information from community meetings into the values layer without a process to ground truth the data. At least a few committee members remarked that this type of information should be verified before being included into the layers of the risk assessment. Also, the number of community members present at meetings varied from one community to the next, leading to unequal representation of values between communities. Currently, this community-based information is used as part of the decision-making process to prioritize fuels reduction projects and is not included in the point or weighting system.

Protection Capability

In guidance to identify and prioritize communities-at-risk, NASF suggests using the Insurance Services Office Fire Hazard Ratings (ISO) to illustrate the depth of protection capabilities within fire districts that demonstrate abilities related to response and fire suppression. The Fire Suppression Rating Schedule is the manual ISO uses in reviewing the firefighting capabilities of individual

communities. The schedule measures the major elements of a community's fire suppression system and develops a numerical grading called a Public Protection Classification. Ten percent of the grading is based on how well the fire department receives and dispatches fire alarms. Fifty percent of the grading is based on the number of engine companies and the amount of water a community needs to fight a fire. Forty percent of the grading is based on the community's water supply, which focuses on whether the community has sufficient water supply for fire suppression beyond daily maximum consumption.

Members of the committee expressed a great deal of concern in regards to using the ISO fire hazard rating as and indicator of protection capability because it is only a measure of structural fire protection. Communities that are threatened by wildland fire may not be well represented by only looking at an indicator for structural fire protection. In order to address this concern, the committee agreed that using data on response times from fire service agencies (including wildland and structural) would be a better indicator for the risk assessment than the ISO ratings.

Structural Vulnerability

The structural vulnerability layer utilizes aerial photos, tax lot information, and ODF data on residential defensible space projects. Aerial photography provided the specific locations of buildings, instead of assuming the center of a tax lot, as Josephine County tax lot maps tend to do. Photography also helped to determine accessibility by showing the lengths of driveways, but does not provide information on the conditions of the driveways or the amount of vegetative clearance available to fire trucks. County tax lot data provided detailed information about roof types that is updated each spring. The assessment also used data from ODF on defensible space from a project funded through County Title III dollars and the National Fire Plan to conduct home assessments and provide homeowners with rebates for defensible space work. While this data is updated annually by ODF, is it not a full representation of defensible space projects throughout the County. The data is limited by the fact that there may be numerous residents that have created defensible space on their own, which would not be represented in the ODF database.

Scoring and Weighting

The County used the data compiled in the risk assessment to rate the various levels of risk among communities. The scoring system that accompanied the data was intended to be qualitative (rated Low, Medium, and High) for each factor (rather than a quantitative value representing actual probabilities or fire behavior outputs). However, because the committee and others wanted to display a “combined” layer map, they needed a method for aggregating values. As the various factors do not contribute equally to overall risk, combining the Risk, Hazard, Protection Capability, Values and Structural Vulnerability layers required weighting of each factor. Though designed by experts in the field of wildfire management and analysis, partners recognized that the assignment of values remained somewhat subjective. No generally accepted system of scoring has been established for risk assessments that span multiple scales (statewide, county, community, and neighborhood.)

Structural Vulnerability was weighted more than twice as much as Protection Capability given studies that found that roof type, defensible space, and defensive action each contribute about 1/3 to the probability of a structure surviving a wildfire. Similar logic was used for weighting hazard – once wildfire gains intensity, protection capability is of little value (i.e., California probably has the best wildfire protection capability in the world, yet claims the most homes burned due to the hazard

values of weather, fuels and topography). Hazard was weighted below structural vulnerability, however, because homes with low structural vulnerability may survive even intense wildfires.

Questions also arose about fire ignitions and population possibly being double-counted. The committee agreed that the scoring for each layer resulted in a comparative, rather than absolute understanding of wildfire risk in the county, and provides a baseline understanding of the conditions. The scoring of risk assessment elements will undoubtedly be tested as communities begin looking more carefully at how their presumed and understood fire risks compare to the colors presented on risk assessment maps. The risk assessment process stands to gain substantially from experience, as well as the input of local experts and community members who know the land well.

SECTION IV: A DISCUSSION OF THE COLLABORATIVE PROCESS

The JCIFP risk assessment committee consists of representatives from a variety of federal, state, and local agencies, and a local community-based organization. The committee held monthly meetings facilitated in part by Resource Innovations (formerly the Program for Watershed and Community Health.) All committee members interviewed said that, overall, they were delighted and impressed with the collaborative process. Several members noted that they had participated in failed collaborative efforts in the past, and this was the first real success they had been a part of. Committee members attributed the success of the process to several key factors: the open environment created by facilitators; participants' communication skills; previous familiarity with each other; and regular meetings with consistent participation.

Early Challenges

The success of risk assessment experience, as some participants pointed out, was not immediate. In the words of one committee member, *"it was apparent that many in the group were not accustomed to collaborative efforts."* Obvious differences in agency culture and protocol, what one participant termed "territoriality," reportedly surfaced between some representatives at the beginning of the process. A few participants held conflicting perspectives the weighting of various layers within the scoring of the risk assessment, as well as other issues. ODF and the County developed the initial proposal regarding weighting the risk assessment committee members then reviewed the proposed scoring. . While they felt they had to take action due to the time sensitivity of the process, they also acknowledged that more collaboration could have been used and more time could have been given to sorting out the details. . The different levels of understanding and experience individuals brought to the table related to wildfire risk assessment also contributed to initial challenges to the process. .

Other challenges included a lack of common terminology, the size of the group, and the difficulties in catching one member after a missed meeting. The different objectives among the federal agencies and the county related to the focus on natural resources versus a focus on landownership resulted in additional challenges for the group. Some committee members also criticized the *"bureaucratic red tape"* that surfaced during the process and resulted in delays in the process.

Great Successes

All committee members generally agreed that *"the uniforms seemed to come off"* throughout the process, and a *"work together"* attitude surfaced. The group brought a range of experiences and skills to the table, which aided the development of the risk assessment. Most everyone was able to make the monthly meetings, and people were impressed with the commitment and work that others put into the process. Members commented on how everyone fostered ownership for the process. Common terminology became understood over time. People admitted that it was good to get differing perspectives and those differing perspectives led to a better product. *"No one was railroading the process."* Some even said that they *"had fun with the process."* Several people acknowledged the capable leadership of the JCIFP facilitators and the "*cheerleading*" of County officials as explanation for the successful collaboration. The many professional and personal roles individuals held gave the group the opportunity to look at the issues from differing perspectives, including that of a homeowner, as well as that of a firefighter or fire chief.

Several individuals involved in the process had known each other for a number of years, having worked together on a variety of projects, including battling wildfires. This familiarity seemed to aid the process. There were *"no mating dances"*, as one member put it, as the group began work with each other. Another committee member remarked that the attitude of the facilitators was a good match for that of others, and it set a very good precedent. Participants agreed that working together over such a long period of time (more than a year) was good for everyone's relationship. *"Individuals who got involved set the stage for collaboration,"* noted one member.

Participants offered different perspectives on the role they saw for involving community members in the process. Some felt that community members (and even more fire district representatives) could have been included in the initial stages of the process. They felt this would have helped out the long-term buy-in of those groups. Others were happy with the level and timing of public involvement, adding that it improved the efficiency of the process (particularly related to the many technical issues that had to be dealt with).

SECTION V: CONCLUSIONS AND FUTURE IMPLICATIONS

The risk assessment is an integral element of a comprehensive fire plan. It is an invaluable tool that can be used to identify communities-at-risk and draw relative comparisons of risk at the local level. Risk assessments also benefit local communities by providing a better understanding of what is at risk while also helping communities to meet eligibility standards for funding. By standardizing the methodology and data, risk assessments may one day allow for comparison across multiple boundaries and result in greater monitoring capabilities at state, regional, and national levels.

Significant fire threats in Josephine County led to the development of the JCIFP and resulted in a risk assessment that lays the foundation for fuels planning and fire protection. The process has been documented in the fire plan and is also serving as a model for other communities to follow. The GIS maps created at the end of the process are now aiding fuels planning and implementation activities throughout Josephine County. While risk assessment committee members acknowledge that the information is not perfect, they feel it provides a general picture of the conditions in the county. Committee members pointed to the following attributes as keys to their success:

- Commitment and consistency on the part of agencies, leading to ownership of the process
- Good facilitation of the process
- Supportive leadership
- Connection of members with the reality of the political and environmental landscape

Oregon Department of Forestry also worked closely with Josephine County with the objective of creating a model for other communities and a methodology for the state to be able to identify communities-at-risk. The risk assessment was the first of its kind in Oregon, and resulted in valuable lessons about the process, data and the findings. As other communities move forward with their own fire planning efforts, they have an opportunity to consider the primary challenges that Josephine County came across, such as the quality of data describing the fuels situation and the weighting of individual factors.

Assessing the Conditions of the Landscape

The distinction between understanding landscape level fire behavior and the assessment of site-specific conditions became one of the most important lessons learned through this process. Community Wildfire Protection Plans emphasize the identification and prioritization of hazardous fuels treatment projects. The JCIFP wildfire risk assessment process resulted in an understanding of the areas that may be most affected by fire, based on the physical and social conditions of the environment and the population. However, understanding the scale of fire that may affect the area and most effective types of treatment for an entire landscape requires an understanding of fire behavior and fuel models that goes beyond the basic risk assessment process. As mentioned previously in this paper, poor fuels data makes it difficult to run models that would be effective. To address this, Josephine County submitted a National Fire Plan Grant for 2005 to obtain better data on fuel conditions in the region. This application has been accepted and work on an improved fuels data survey is expected to begin in the summer of 2005.

Recommendations

Based upon the Josephine County experience, interviews with experts in the field, and general observations, we provide the following recommendations, which can be applied to local, state, and federal agencies as they begin or continue with their risk assessment processes:

1. Agencies and organizations must commit consistent time and financial resources to the risk assessment process, as long as large-scale wildfire dangers exist.
2. Agencies and organizations developing risk assessments should look closely at available data with a critical eye and examine its relevancy and accuracy.
3. Agencies and organizations must consider whatever weighting and scoring employed very carefully, with a consistent approach aimed at prioritizing areas of risk an appropriate scale.
4. Good facilitation is key, and may be more effective coming from an external organization. This will help ensure that no one agenda is leading the process and that all ideas are brought to the table and have a voice. Consider who will make a commitment to provide long-term assistance .
5. Involve key participants from the public, private, and non-profit sectors from the start. Once baseline information has been developed, find the most appropriate times and methods to involve the general public and allow ample time for input. Provide methods for evaluation and revision of the assessment.
6. Ensure communication between those assessing risk and the planners responsible for abating it.
7. As implementation begins, use the least controversial and most beneficial areas first as testing grounds for the methodology and as a way to get buy-in from the public.

We have also identified regional and national recommendations focused on standard methods for data collection and assessment.

8. Foster coordination among public agencies to identify and use standard data sets and methods for fuels, fire occurrence and response times.
9. Use a graduated scoring system to prioritize communities-at-risk across the state. There are infinite variables that go into wildland fire risk. A graduated scoring system will help officialsto stay current with the changes in the landscape. Identifying a standard measure to prioritize risk is essential in terms of funding and attention. At a statewide level, consider increasing the weights of the weather classification (Classes I-III) to account for regional discrepancies and assist with prioritization of funding.
10. On a regional scale, there will need to be oversight and accountability for the scoring system to ensure that communities do not use the assessment tool incorrectly, and to maintain some consistency across the state. This will aid agencies as decisions are being made about funding allocation. Consider coordinating guidelines for scoring through an association such as the Pacific Northwest Wildfire Coordinating Group or the National Association of State Foresters.
11. Foster Congressional and Agency support for local assessment and data collection that will enhance the use of national programs such as LANDFIRE and fuel modeling programs such as FLAMMAP or FARSITE. Increased investment in better fuels data and interagency collaboration will result in more comprehensive assessments and more accurate fire behavior models. Establish a system that can be updated through agencies on work that has been done of fuels reduction and latest information on fires.