J4.3 THE USE OF CLIMATE INFORMATION IN PRESCRIBED FIRE PLANNING AND IMPLEMENTATION

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1. INTRODUCTION

Climate and its impacts on fuels and fire behavior has become an increasingly important component of fire management in the last decade. The links between anomalous wildfire years and conditions such as drought, the El Niño Southern Oscillation, or Santa Ana east wind events are well-documented in the literature (Swetnam and Betancourt 1990, Westerling et al. 2003, Westerling and Swetnam 2003). Additionally, fire management uses forecasts of these types of climate conditions to plan budgets appropriately, and locate contingency resources where necessary in anticipation of the annual western wildfire season (Brown 2003).

One aspect of climate on fire management decision-making that has been previously overlooked is how climate impacts prescribed fire use. Management-ignited fire is used to treat over two million acres of public lands each year, and there is increasing pressure for this number to rise as fire managers attempt to reduce hazardous fuels levels and restore potential natural conditions in forests and rangelands. Since the condition, composition, and volume of fuels on the landscape is controlled indirectly by climate regimes, and windows of opportunity to use prescribed fire are also subject to fluctuations in weather associated with climate cycles, it is important to assess whether prescribed fire managers are utilizing climate information in planning and executing prescribed fires. Using climate information appropriately can help prescribed fire managers better understand the current conditions of their fuels, the fire behavior that will be associated with burning those fuels, and allow them to take full advantage of burn windows (Brown and Betancourt 2001).

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This study assessed whether or not prescribed fire managers are currently utilizing climate information to help them plan and execute prescribed fires. It also looked at what some of the primary obstacles are to utilizing prescribed fire to its fullest potential in different regions of the United States, and how objectives in prescribed fire use differ between agencies. Finally, it draws some conclusions about the potential problems associated with failing to use climate information for long-term fire effects.

2. BACKGROUND

The question of how climate information affects prescribed fire use has not yet been directly addressed in scientific literature. Prescribed fire is a well-researched topic, but most of the inquiries have been directed at prescribed fire effects on vegetation, landscape dynamics, and air quality. The importance of understanding the relationship between climate and prescribed fire use, however, stems from three primary objectives of prescribed fire use. First, fire managers utilize prescribed fire to mimic the role of naturally occurring wildfires on the landscape. The patterns and frequency with which these wildfires occurred prior to European settlement, and the present-day removal from these historic conditions, is described by the Fire Regime Condition Class (FRCC) assessment (Hardy et al. 2000). The FRCC assessment, and the desire to restore ecosystems to Class 1, or "natural/historical" conditions, is one of the primary objectives of prescribed fire use. To best mimic a process that occurred historically under variable climatic conditions, prescribed fire managers need to understand the role that climate played in shaping the ecosystems they are managing, and understand what role climate continues to play today in their management prescriptions. Using prescribed fire under inhospitable climatic conditions, or conditions far different from historic regimes, will not result in ecosystem restoration.

A second objective for prescribed fire use across the country is the prevention of escaped

prescribed fires, or management-ignited fires that escape control and are designated as wildfires. The correlation between increased incidence of escaped fires and sustained drought or wet periods is evident in at least one portion of the western U.S. (Kolden 2005), and using climate information to predict increased potential for escaped prescribed fires is necessary to reducing the number of escaped fires that occur. The ramifications of large, destructive escaped prescribed fires were evident in the aftermath of the 2000 Cerro Grande fire near Los Alamos, New Mexico, and the prevention of another escaped fire like this is essential to a national prescribed fire use program.

Finally, a third objective for prescribed fire use that benefits from utilization of climate information is maximizing the potential to burn under the best meteorological conditions. Optimal meteorological parameters, described as “burn windows” by fire managers, allow fire managers to complete their management objectives while minimizing smoke and other impacts to surrounding communities. The occurrence of these burn windows fluctuates on annual or longer temporal scales, and larger, more optimal burn windows may occur under specific climatic conditions. Only by understanding and monitoring these climatic conditions can fire managers maximize their use of optimal prescribed fire use conditions.

Understanding the empirical relationships between climatic conditions and prescribed fire use is only useful if the fire managers who use prescribed fire are able to utilize climate information in their planning and implementation of prescribed fire. Therefore, this study was implemented not to assess specifically what climatic conditions are favorable or adverse for prescribed fire use, but to determine whether fire managers can even utilize climate information in their prescribed fire use programs.

3. METHODS

We created a survey to assess how prescribed fire managers utilize climate information. We asked questions about what types of weather and climate indices fire managers use for prescribed fire purposes, how long the review process is for prescribed fire plans, if fire managers are measuring on-site fuel moistures, what some of the primary obstacles are to completing prescribed burns, and what the primary cause of escaped fires has been for their unit. Initially, the survey was administered to prescribed fire managers in northern California (including the southern Sierra Nevada) and Nevada as part of a focused case study. The survey was expanded in 2005 to include fire managers throughout the United States, and a total of 192 prescribed fire managers were surveyed. All five of the primary federal land management agencies that utilize prescribed fire were included (BIA, BLM, FWS, NPS, and USFS), as well as numerous state agency personnel. Additionally, each of the 11 Geographic Areas designated by NICC were represented (Fig. 1).

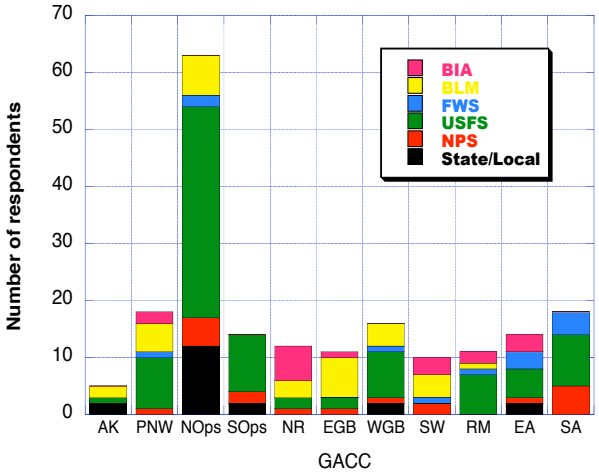

Figure 1. Number of survey respondents by Geographic Area Coordination Center (GACC) region and agency.

4. RESULTS

Two survey questions were used to assess whether or not respondents were using climate information in their prescribed fire programs. First, we asked what the top influences are on how respondents set their targets for burning each year. Funding was the top influence for 41% of respondents, while issues such as resource availability or timber sale activity influenced an additional 23%. In looking at the role of climate, we determined that only 2% of respondents felt that climate information or seasonal climate forecasts were the top influence on their target planning, while only 17% of respondents felt that climate information or seasonal climate forecasts were one of the top three influences for setting annual targets (Fig. 2).

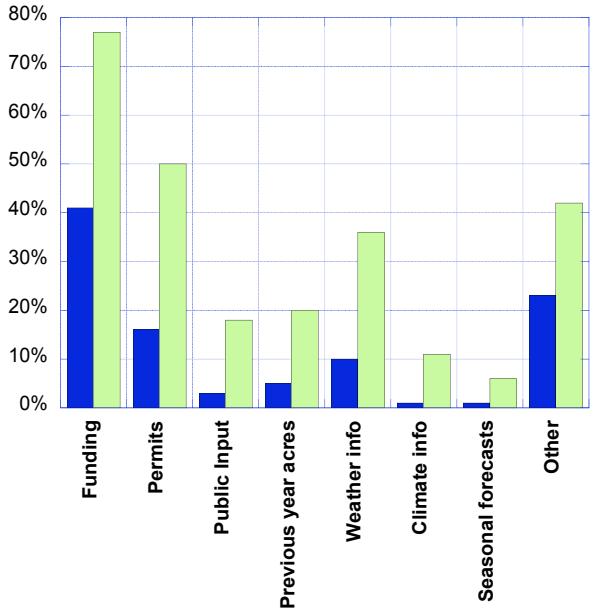

Figure 2. The top influence (solid blue) and top three influences (light green) on how respondents set their annual acreage targets by percent of respondents.

The second question that assessed whether or not prescribed fire managers utilize climate information asked respondents if they do or do not use a series of data sources, tools, and indices that track weather and climate and impacts on fuel conditions. These included RAWS, seasonal climate forecasts, National Weather Service forecasts, KBDI, Palmer Indices, the US Drought Monitor, FireFamilyPlus, etc. While most respondents indicated that they use RAWS data (93%) and the National Weather Service forecasts (93%), other tools that better indicate climate anomalies are not used as widely. KBDI (33%) and the Palmer indices (27%) are used by less than a third of respondents to assess conditions for prescribed fire, while 51% use historical weather data, and less than half utilize the FireFamilyPlus software program (44%). Low use rates for these and other indices indicate that prescribed fire managers are primarily taking into account weather influences on prescribed fire use, and not climate influences.

The low use rate of climate information may stem from the constraints felt by many respondents on when they can utilize prescribed fire. Many noted that they are unable to utilize optimal burning windows due to air quality regulations, conflicts with Threatened and Endangered (T&E) Species requirements, a shortage of qualified personnel and resources, and the perceived wildfire threat in other parts of the country affecting local willingness to put fire on the landscape. Distinct differences between eastern and western managers were evident in terms of their constraints, and smoke management was a local constraint felt by all agency respondents in specific airsheds such as southern California's San Joaquin Valley, the Missoula area in western Montana, the Carolina plains, and near the National Parks with the highest tourism rates.

The influence of the National Fire Plan and follow-up directives such as the Healthy Forests Initiative were easily detected when respondents were asked what their two primary objectives for prescribed burns are. Hazardous Fuels Reduction was the top answer, with 93% of respondents indicating that this is one of their top two objectives. Additionally, 45% of respondents chose Ecosystem Restoration as one of their top two objectives, while 27% said they burned for Habitat Improvement (Figure 3).

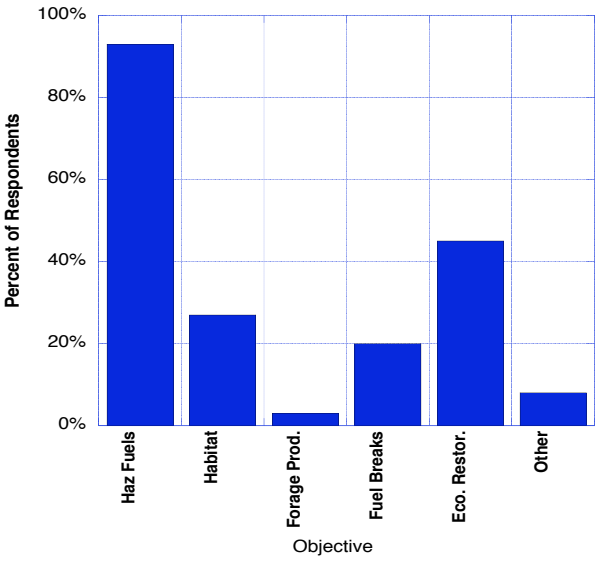

Figure 3. Percent of top two primary objectives for prescribed fire use.

5. CONCLUSIONS

The push to return ecosystems forged under changing climatic conditions to historic natural conditions should incorporate those same climate conditions. The only way for prescribed fire managers to accomplish this is by utilizing climate information in the planning and execution of prescribed fire, but our results indicate that

prescribed fire managers are not using climate information in their prescribed fire programs. This is partially due to objectives centered around hazardous fuels reduction, and partially due to the numerous regulatory and political obstacles that prevent prescribed fire managers from utilizing optimal burning windows. This suggests a reevaluation of the infrastructure under which prescribed fire currently operates is necessary if ecosystem health objectives are to be reached. It also suggests that if prescribed fire managers continue to exclude using climate information from the planning and implementation of prescribed fires, there is an increased potential to have prescribed fires escapes control and turn into destructive wildfires like the Cerro Grande fire.

Finally, increased national landscape treatment targets will only be met when climate information is utilized to maximize the use of burn windows, as the current infrastructure prevents fire managers from utilizing optimal burn windows, and often sees them missing several burning windows each year even as they fail to reach annual treatment targets. Overall, a reassessment of national goals for prescribed fire use is necessary to best utilize climate information for meeting local objectives.

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