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CROSS-PROJECT SYNERGY IN DEVELOPING DECISION SUPPORT TOOLS FOR WILDLAND FIRE MANAGEMENT

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1. Introduction

The recent increase in large-scale regional fires across the US West is stimulating considerable attention among the public, politicians, and the media and is intensifying calls for action to reduce fire risk and fire damage. While national policy is essential to coping with widespread fire hazard, translating policy into strategic planning and action must have strong regional and local components. As is the case across the US generally, wildland fire regimes in the Southwest are a product of complex interactions among climate, vegetation and fuels conditions, fire history, societal policies, and human behavior, and require regional-scale approaches.

Wildfire Alternatives (WALTER), based at the University of Arizona, seeks to improve fire management through development of decision support tools for strategic planning. Two projects under the WALTER research umbrella provide examples of how integrated fire-climate-society research is being carried out.

2. Fire-Climate Forecasts

The first research activity involves an ongoing project to provide climate information for strategic planning for management of wildland fire hazard. It is supported under the NOAA-OGP funded Climate Assessment for the Southwest (CLIMAS) project. The fire-climate initiative involves development and operationalization of seasonal to annual-scale fire-climate forecasts and of forecast skill evaluations for use by fire managers. The initiative, being operationalized by the Predictive Services group of the National Interagency Fire Center, generates fire forecasts for United States and for each of the administrative regions. The first climate-fire outlook for wildland fire management was produced in early spring 2003 by NICC, following a series of annual fire-climate workshops organized by CLIMAS. The workshops, always held in late winter or very early spring (see, eg, Garfin and Morehouse 2000), have brought together fire managers and climatologists to share knowledge and discuss potential conditions for the upcoming fire season. The 2003 workshop was unique in that it constituted the first-ever effort to develop an integrated climate-fuels assessment for the upcoming fire season for the entire United States. A seasonal fuel and fire assessment was developed for each region. The regional assessments were then synthesized into a national map which has been updated as the season has progressed. The products of this process provide information useful to regional stakeholders, such as those in the US in the Southwest, for assessing potential fire risk conditions.

3. Integrated Fire-Climate-Society Model

The second research activity under WALTER has involved construction of an integrated Geographic Information Science (GIS) model called FCS-1 (Fire-Climate-Society, Version 1). This project was a direct outgrowth of the first CLIMAS climate-fire

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workshop, which was held in February 2000. The model will produce fire risk maps from a variety of underlying data elements, including climate, fire history, vegetation, fuels, and societal factors. The work builds on research carried out by, among many others, Schmidt et al. (2002), Grissino-Mayer and Swetnam (2000), Swetnam and Betancourt (1999), Finney (1998), Yool (1998), and Kauth and Thomas (1976). The project is supported by funding from the Environmental Protection Agency's STAR program. The model is designed to be a web-based tool that, when completed, will allow decision makers to construct fire risk maps under a selected set of alternative climate scenarios. The model covers four study areas: the Catalina-Rincon Mountains, Huachuca, and Chiricahua Mountains in Arizona, and the Jemez Mountains in New Mexico. The risk maps produced by FCS-1 are constructed at a scale of one kilometer, which is the finest scale at which climate information can be reasonably integrated.

In FCS-1, different combinations of winter and spring climate conditions link with related fuels conditions, as well as with basic information about vegetation type, fire history, and topographic characteristics to produce a fire *hazard* map layer. The model combines these GIS layers with layers representing societal factors such as distance to a road, value of recreational opportunities, and data collected from a survey of stakeholders in each study area, to produce an integrated fire *risk* map. The various elements in the fire hazard and fire risk layers will be weighted to account for the differential influence of each on fire potential in the study areas. For example, information was gathered from survey participants who marked information, such as areas that they would "really hate to see burn," on paper maps. The map responses were then individually digitized into GIS layers and summarized (Perin et al. 2003). The resulting map layers will be integrated into the FCS-1 model and will be subjected to user evaluation to determine weightings relative to the model's other fire risk components.

When FCS-1 is operationalized (targeted for early 2004), managers and others will be able to use the fire-climate forecast information produced by the Predictive Services group, in collaboration with CLIMAS and with the Center for Environmental and Fire Applications at the Desert Research Institute, to select from among different scenarios in the model – for any of the four case study sites – and to produce a fire risk map at a scale of 1 kilometer. (This is the finest scale feasible for the climate information.) Users will interact with the model through the WALTER web site. The web site will also provide users with access to maps depicting the fire history of the study site, reviews of policies pertinent to fire management, and basic information about the study areas.

4. Cross-Project Synergy

Fostering synergies among related projects provides an opportunity to accomplish more than might otherwise be done within the parameters of a single initiative. Within WALTER, synergies between the two projects described above allow individuals involved in the two projects to share knowledge, data, and experience. For example, availability of seasonal fire-climate forecasts for use in running the model, and availability of fire risk maps for use by the climate community in understanding the potential implications of forecasts at a 1-kilometer spatial scale. In broader terms, these two efforts to build decision support tools for wildland fire management provide a valuable set of skills and experience that can be marshaled for expanding research and development efforts in a manner that increases knowledge and understanding of complex fire-climate-society interactions, iprovides finer-scale spatial and temporal coverage, and enhances capacity to translate science into societally beneficial informational products.

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