

Western Ecological Research Center

Publication Brief for Resource Managers

Release:
August 2007

Contact:
Dr. Jon E. Keeley

Phone:
559-565-3170

Email and web page:
jon_keeley@usgs.gov
<http://www.werc.usgs.gov/seki/keeley.asp>

Sequoia and Kings Canyon Field Station, USGS Western Ecological Research Center, 47050 Generals Highway #4, Three Rivers, CA 93271

A Critical Assessment of the Burning Index Used in Fighting Wildland Fires

A new study headed up by University of California, Los Angeles statistician Dr. Rick Schoenberg along with USGS research ecologist Dr. Jon Keeley and coauthors from the University of California and the California State University suggests improvements in the index commonly used to predict wildland fire potential. The study, published in the August issue of *International Journal of Wildland Fire*, found that the predictive capability of the commonly used Burning Index was quite limited and proposed an index with improved predictive ability for Los Angeles County, California.

Predicting fire danger figures prominently in fire management planning and involves the assessment of the fire environment that determines the ease of ignition, rate of fire spread, difficulty of control, and fire impact. Fire danger rating provides an index for managers that is an integration of weather, fuels, and other factors and is often used to direct fire management activities such as the scheduling of prescribed fires, fire prevention activities, staffing for fire control, and forest closures. It is expressed as a numerical index, and weighting of the factors that make up this index vary regionally, with different indices in Australia, Canada, and the United States. The Burning Index is based on many fuels and weather variables and is often interpreted as the potential fire flame length, and it plays an important role in determining the ability of fire fighters to actually suppress fires. Since the Burning Index reflects on the probability of containment, particularly at initial attack, and this is tied to final fire size, one measure of the value of the Burning Index is the historical relationship of annual variation in the Burning Index to fire incidence and area burned.

Management Implications:

- In Los Angeles County, California, the Burning Index often used in other parts of the country is weakly correlated with area burned over the last century.
- Wind speed alone has a higher correlation with burned area.
- An alternative model with more predictive power includes just the weather and climate variables of wind speed, relative humidity, precipitation, and temperature.

The authors evaluated the effectiveness of the Burning Index at predicting wildfire activity in Los Angeles County, California, a region known for its high-intensity crown fires in often very rugged terrain. This landscape is vulnerable to high-intensity crown fires due to the highly flammable fuels, long summer drought, and autumn winds.

This study showed that although the Burning Index was positively associated with fire incidence, its performance in predicting area burned was poor relative to much simpler models that incorporated only weather variables. Since wildfire risk indices are used for multiple purposes, including insurance and urban planning as well as fire department resource management, it is important that this index is modified to provide the most accurate predictions of wildfire danger.

Schoenberg, F.P., C-H. Change, J.E. Keeley, J. Pompa, J. Woods, and H. Xu. 2007. A critical assessment of the burning index in Los Angeles County, California. International Journal of Wildland Fire 16:473-483.