Climate information and prescribed fire

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In 2003, I began a survey that asked whether or not fire managers were utilizing climate information for decision-making on prescribed and WFU fires. The results of that work led to the article, Beyond wildfire: perspectives of climate, managed fire and policy in the USA, published in 2010 in IJWF by myself and Tim Brown.

Several key elements came out of that research. One was a recognition that climate had yet been directly addressed in national fire policy. Another was that there were several obstacles to practitioners using climate information for prescribed fire, including a lack of training, a lack of information availability, and a focus on fire management at a shorter temporal scale than is likely useful for integrating climate information.

In light of this work, my colleagues and I have undertaken a range of projects to try and address some of these issues. For example, we are conducting a synthesis of how climate inadvertently affects national fire policy through indirect impacts: major fatality and large fire events that were associated with unrecognized climate anomalies, changes in fire policy that unwittingly coincide with long-term climate trends, and accomplishments in the national fuels program. As part of this project, we have also begun to catalogue where training on fire climatology shows up in NWCG courses, such as RX-341 and S-590, with the goal of making strategic recommendations for increased climate training in NWCG courses.

Recognizing that some fire managers see too many obstacles to using climate information, we are also working on projects that identify reasons and means to overcome those obstacles. For example, we are working with three national forests in Southern California on a JFSP-funded project to look at changes in fuel break effectiveness under future climate conditions. This project will not only give fuels planners there better information about which fuel breaks are likely to meet objectives under future climate conditions (and which ones might need a different treatment plan), but it will also provide planners with “future” RAWS files for 10 RAWS in the region that they can use when planning new projects. As the public and NGOs continue to push forest planners to select minimal landscape disturbance options, we hope this project will provide a better sense of the minimum treatment needed to meet fuel break objectives for 2050 (using climate projections), not 2000 (using historic climate).

On another project, we are collaborating with CLIMAS at the University of Arizona to identify the value of seasonal climate forecasts and better understand how climate information gets into the hands of managers who need it. This project is helping us identify the best way to disseminate new climate science and information to local and regional practitioners through a social network analysis, but it is also helping us to identify how that information can be used to forecast severity requests and prioritize resources at the national level. We hope this will allow us to improve seasonal forecasts and better tailor them to user needs.

Most importantly, we have also continued to develop products that are meant to help fire managers from local to national levels, especially for prescribed fire. The Western Regional Climate Center has released two visual drought products in the last two years that make it much easier for a land manager to understand not only the current magnitude of drought at their location, but also the frequency and magnitude of drought historically, which can be an invaluable planning tool. These are the West Wide Drought Tracker and WestMap. The Climate, Ecosystem and Fire Applications (CEFA) Program, of which I am a part, has recently produced a seasonal prescribed fire outlook that helps managers to identify which regions are more likely to see opportunities for prescribed fire and which are less. CEFA has also developed a prescribed fire 'historic window' tool that allows a user to input burn window parameters and select a RAWS, to which the tool returns a historical analysis of how often that burn window occurs and its distribution over the period of record for the RAWS. These tools join a suite of products that were already available at WRCC and CEFA, including CANSAC forecasts for air quality, gridded RAWS data, and interactive RAWS exploration tools (including wind roses).

My research is best summarized thus: we know that fire-climate relationships are important from the considerable amount of science that addresses them. The challenge is figuring out what that means on a day-to-day basis: knowing what we know about these relationships, how can we use climate information to our advantage? We can use it to:

1) Restore degraded ecosystems by timing our prescribed burns correctly (from a climatic perspective) to achieve desired fire effects

2) Achieve hazardous fuel reduction objectives by taking a long-term approach and being ready for windows of opportunity

3) Mitigate risks in both wildfire and prescribed fire by fully recognizing the impacts that climate anomalies have on fire behavior

4) Increase public awareness of both current and future fire danger

5) Support our fire management decisions to the public, to our elected officials, and in our planning documentation

Selected Publications

Kolden, C.A. and T.J. Brown. 2010. Beyond Wildfire: Perspectives of Climate, Managed Fire and Policy in the U.S.A. **International Journal of Wildland Fire** 19(3): 364-373.

Jones, B., C.A. Kolden, R. Jandt, J.T. Abatzoglou, F. Urban, and C. Arp. 2009.Fire behavior, weather, and burn severity of the 2007 Anaktuvuk River tundra fire, North Slope, Alaska. **Arctic, Antarctic, and Alpine Research**. 41(3): 309-316.

Kolden, C.A. and P.W. Weisberg. 2007. Assessing accuracy of manually-mapped wildfire perimeters in topographically dissected areas. **Journal of Fire Ecology** 3(1): 22-31.

Kolden, C.A., and T.J. Weigel. 2007. Fire risk in San Diego County, California: A weighted Bayesian model approach. **The California Geographer** 47: 1-17.

Kolden, C.A., and J. Rogan. In review. Mapping wildfire burn severity in the Arctic tundra: novel approaches for an extreme environment.

Kolden, C.A., and J.T. Abatzoglou. In review. Evidence for changing fire regimes associated with increasing temperature in Alaskan interior boreal forest.

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