



An early-warning mapping tool for forecasting fire risk on DoD lands in the arid West

Project # 17-834

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For Open Publication

Background:

The DoD manages approximately 45,700 km² of land within the Great Basin, Mojave, and Sonoran Deserts which represents 47% of all of the land administered by the DoD in the United States. To different extents, these sensitive desert ecosystems are all negatively impacted by non-native invasive plants, which increase fire frequency and come to dominate post-fire landscapes. As a result, nearly one half of all DoD lands in the US are faced with the consequences of a rapidly changing fire regime, such as biodiversity loss and fragmentation of native habitats. In these increasingly dynamic and vulnerable ecosystems, managers have recognized that it is ecologically and economically very difficult to restore landscapes once fire extents and frequencies exceed historical patterns, and have expressed the need for tools for the early detection of fire risk.

Objective:

The project objectives were to capitalize on readily-available remotely-sensed and other spatially continuous data to: a) build and evaluate spatially-explicit models and maps of fire risk in the Great Basin, Mojave, and Sonoran Deserts (i.e., the project area), where the grass-fire cycle is driving irreversible landscape change; b) use these outputs to create a simple 'early-warning' mapping tool that can be used by DoD and surrounding jurisdictions to monitor and manage fire risk at a high spatial (250m) and temporal (1 week) resolution; and c) deploy the tool as a web application, which continually and automatically integrates new acquisitions, and be made available to users without the need to download data or use specific or proprietary software.

Summary of Approach:

We began by exploring existing, related web-based tools and datasets for fire risk monitoring, and interviewing natural resource managers at DoD installations within the project area. During this phase, we synthesized how managers currently make fire management decisions, and how a new tool would meet the specific needs of DoD managers. Following this planning phase, we developed statistical models of fire risk. Specifically, we modeled fire risk as the conditional probability of large fire (i.e., > 300 acres), which we define as the probability that an area on the landscape will burn in a large fire following either an

ignition event or fire spread to that area. After gathering information from natural resource managers, reviewing existing decision support tools, and building statistical models, we developed an interactive mapping tool that automatically deploys spatially explicit predictions of fire risk (i.e., interactive maps) and meets the needs expressed to us by DoD managers.

Benefit:

This work will promote sustainability of approximately 45,700² km of military training land across 51 installations by mitigating the grass-fire cycle. The mapping tool will direct attention and resources to localized areas with high fire risk within and across installation borders. The accessibility of the tool will promote coordinated mitigation of fire and fuels management between DoD and seven different state and federal agencies that administer land adjacent to the 51 installations mentioned above. Lastly, the tool can help mitigate ongoing habitat and species loss due to the grass-fire cycle, as well as possible future restrictions resulting from regulatory actions, such as those mandated by the endangered species act.

Accomplishments:

Daily spatial predictions of fire risk were created at one-week intervals from 2005 through the present, at 250m resolution. Using mapped predictions of fire risk, and a testing dataset of fires that occurred from 2005-2018, we extracted predicted values at the time and location of individual testing points. Based on this testing dataset, overall accuracy of the predictions ranged from 77% to 90% across the desert ecoregions. To create predictions for the present week, we developed a continuous integration 'pipeline' to automatically generate new predictions every week, and push them up to the mapping tool. The tool, user's guide, and metadata are available at www.desertfire.net. A recorded webinar from September 13, 2018 with more background on the tool is available at <http://www.dodnaturalresources.net/Webinar-Series.html>.

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