Rapid Assessment of Fuel Load Using the GLOBE Observer Fire Fuel App

Taylor Jennifer[1], Parsons Russell[2], Riebeek Kohl Holli[3], Andersen Travis[4], and Overoye David[3]

[1]University of Colorado at Boulder
[2]US Forest Service Missoula
[3]Science Systems and Applications, Inc.
[4]University Corporation for Atmospheric Research

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Abstract

Forests are becoming drier due to a warming climate thus increasing the risk of wildfires. In recent years, wildfires have grown larger and more severe. In the U.S., over 80% of wildfires are human-caused and such events can substantially extend the fire season. At the same time, more and more people are living in areas where wildfires can burn. Recent fires have illustrated the devastating consequences of fires in the Wildland Urban Interface (WUI). In this context, the ability to rapidly assess fuel load is crucial in assessing and managing the risk of wildfires. Current methods for monitoring fuel loads (e.g., FIREMON, Brown's Transect) are accurate but time- and personnel-intensive. The Global Learning and Observations to Benefit the Environment (GLOBE) Observer Fire Fuel app is being developed using the Photoload Sampling Technique to offer options in rapidly assessing fuel loads by 1) providing citizen scientists with a fast and easy method to monitor WUI fuel loads, enabling them to contribute to the knowledge of fuels in their communities, and empowering them to think more about how fuels might be managed in their area; and 2) offering natural resource managers and fire science researchers a detailed, scientific application that primarily aids experts already studying fuels to better collect the fuels data they need. This poster will provide an overview of the GLOBE Observer Fire Fuel app and the current app development status. We will highlight the value and opportunity the power of smartphones and tablets offer to rapidly assess fuel loads via an app-based method compared to collecting the data on paper. We greatly welcome input from the fire science community at this point of the fire fuel app development.

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[1]University of Colorado Boulder-CIRES, [2]USFS Fire Sciences Laboratory, [3]Science Systems and Applications, Inc., [4]UCAR

Climate Change Has Increased Wildfire

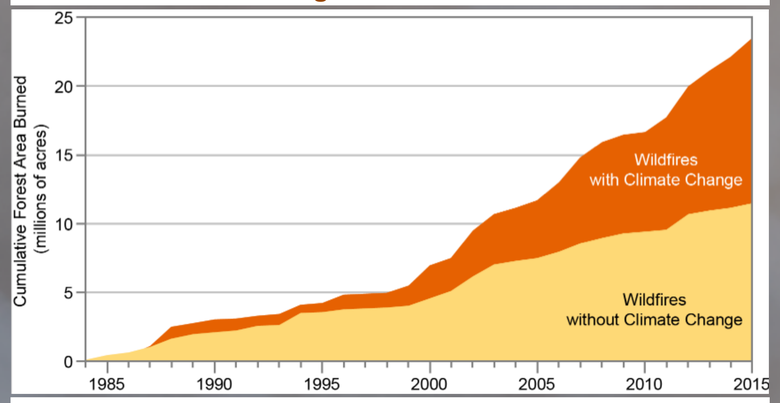

Fig. 1 The total area burned by wildfire in the Western U.S. has doubled due to climate change (National Climate Assessment, 2018).

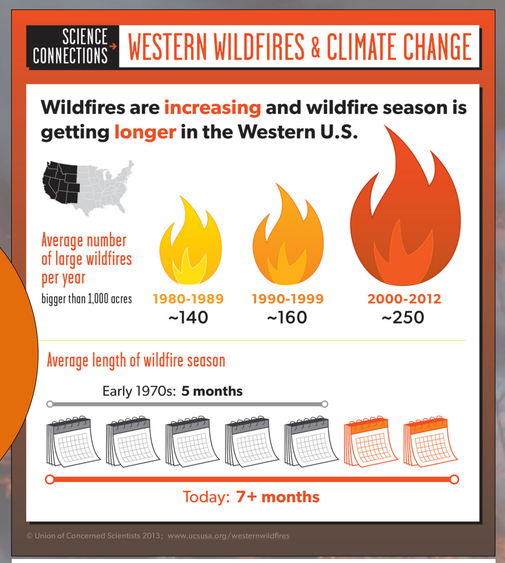

Fig. 2 The number of wildfires and the length of the wildfire season is increasing in the Western U.S. (Union of Concerned Scientists, 2013).

Citizen Science & Fuel Load Monitoring
Involving the public to survey fuel loads allows for widespread and ample data collection to support forest management with critical data while providing public outreach about wildfire risks and prevention.

The GLOBE Fire Fuel Protocol

The current GLOBE (Global Learning and Observations to Benefit the Environment) Fire Fuel protocol is a paper-based survey using the standard Brown's planar intercept method. Because this methodology is complex and time-consuming, no data have been recorded. **The goal of this project is to develop a simplified protocol as both a paper-based version and a new correlated GLOBE Observer app to enable citizen scientists to efficiently collect viable fire fuel data.**

The GLOBE Fire Fuel protocol will be part of the GLOBE Observer app (Fig. 3). Users follow adapted Photoload method screen prompts (Fig. 6) to enter data for 1-hr, 10-hr, and 100-hr fuels, plus forbs and grasses in 1m x 1m plots. Users photographically document the plots and the surrounding land (for additional perspective and to estimate 1000-hr and shrub fuel loads). Data and plot photos can be stored and uploaded to the GLOBE Database when an Internet connection is available. Step-by-step instructions guide the paper-based-protocol user (Fig 7).

The GLOBE Observer Fire Fuel App
The GLOBE Observer team based at NASA Goddard is developing the GLOBE Fire Fuel protocol as a component of the GLOBE Observer app. Planned release: summer 2019

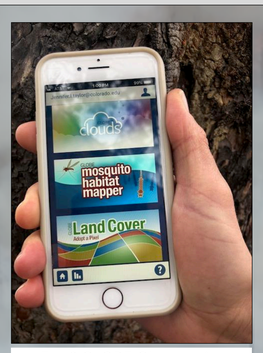

Fig. 3 GLOBE Observer App

Fig. 4 Photoload 1m x 1m Plot Example

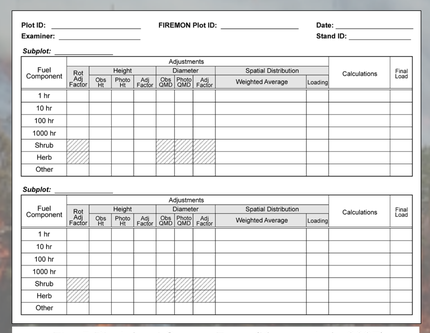

Fig. 5 Photoload Survey Form (Keane et al., 2007)

Benefits of the Photoload Method

Photoload monitoring is a more intuitive way to teach and estimate fuels, compared to traditional fuel monitoring methods (e.g., Brown's planar intercept method—see Fig. 8), which require in-depth training, a high-level of expertise, and often prohibitively long field time to implement. By using the Photoload method, the GLOBE Observer Fire Fuel protocol app will guide users through the different fuel types; from a menu of images, users select the one that most closely represents the fuel density at their location.

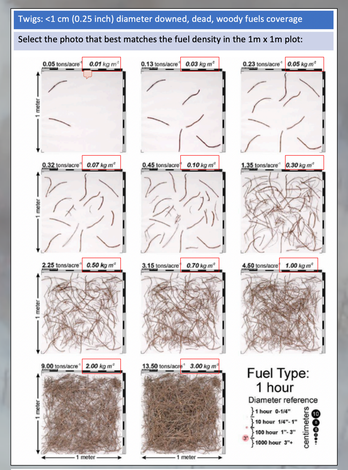

Fig. 6 Fire Fuel App Wire Frame Concept Draft (Image: Keane et al., 2007)

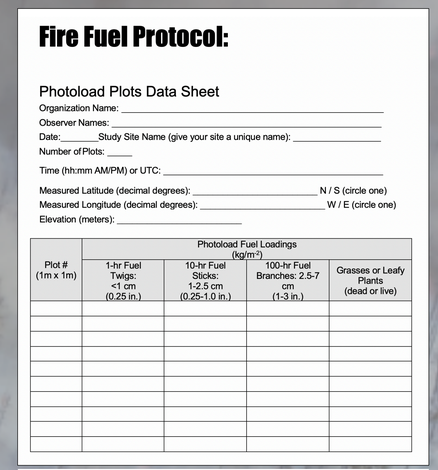

Fig. 7 Fire Fuel Protocol Concept Draft

Wanted: Fire Fuel App Pilot Partners
Researchers, resource managers, and communities are needed to pilot the GLOBE Observer Fire Fuel app.
Contact:
Jennifer.L.Taylor@Colorado.edu

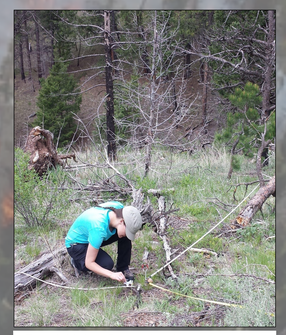

Fig. 8 Using Brown's planar intercept method to assess fuel loads.

Why Fuel Load Monitoring is Important

Over the past 20 years in the U.S., 84% of all wildfires were human-ignited, which more than tripled the length of the fire season (Balch, et al., 2017). In 2017, wildfires burned more land than the previous 10-year annual average in the U.S. (III, 2017). Although fire is necessary to maintain forest health, fire suppression efforts over the past century have resulted in an unnatural buildup of fuel loads (e.g., trees, needles, shrubs, grasses), increasing wildfire hazard (NPS, 2015). Despite increasing risks to ecosystems and communities, collection of fuels data critical to fire and resource management is sparse and far below an adequate level for monitoring; only a few isolated data points exist. Leveraging the power of citizen science will enable expanded data collection to inform fuels management.

Photoload Sampling Technique

The Photoload method utilizes visual data collection to rapidly identify and quantify the types and percent coverage of fuel loads. Keene (2007) has shown that this photo-based method has proven to be a quick, efficient, and accurate monitoring method for 1-hr, 10-hr, and 100-hr fuels (downed, dead, woody fuels) using 1m x 1m plots (Fig. 4) and 1000-hr fuels (logs) using 10m x 10m plots. This approach relies on a modification of the FIREMON (Fire Effects and Monitoring Inventory System) methods (Fig. 5), thus fuel load data is comparable to other regional monitoring and research efforts (CFRI, 2017).

Project Information

Contact: Jennifer.L.Taylor@Colorado.edu CIRES website: cires.colorado.edu/outreach/
The GLOBE Observer app: observer.globe.gov

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Project Partners:

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