Forest Fuels Management and Biomass Utilization Bibliography:

Knowledge Available for Management of North American Forest Fuels
With Consideration of the Potential Uses of the Woody Biomass
Generated by the Fuel Treatments

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A literature review regarding forest fuel reduction, isolation or modification treatments that can be used to reduce the risk of wildfire spread; including opportunities to use the biomass generated from those treatments. To address the need to employ silvicultural knowledge; to improve the cost benefit ratio and to manage for multiple forest resource values when managing hazardous forest fuels.

Keywords:

Acknowledgements:

It is with great appreciation I thank the numerous authors that have contributed to the currency and breadth of this bibliography. In particular I would like to recognize the assistance and guidance provided by Marty Alexander and Mark Ryans. I would also like to acknowledge the additional information provided by literature reviews and bibliographies by:


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While reaffirming the theoretical basis that fuel breaks can be used to alter fire behavior, the authors acknowledge that criteria for fuel break construction and maintenance require development. Without fuel break standards, fuel break effectiveness will continue to be questioned. The authors recognize fuel breaks can never be a standalone treatment; rather that they need to be used to complement wider scale landscape treatments.

The author argues ecosystems evolve as a result of natural disturbance and these influences cannot be entirely excluded. Therefore a choice to do nothing is a choice of action, although not always one with a desirable outcome. The more we protect the forest from fire the greater the severity and area burned when wildfire does finally occur. Therefore active management is required to reduce potential wildfire intensities and lower crown fire potential. The author also discusses a process approach versus a forest structure approach for forest restoration based on unique stand conditions and past fire regime. However the author’s position, that any ecosystem preservation strategy needs to be considerate of goals broader than extractive use, is weakly presented.


A good summary of important principles that should be employed when using fuel reduction treatments to reduce surface fuels, increase the height to live crown, decrease crown density and retain large fire resistant trees. The discussion is supported by empirical examples from five wildfires.


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*Valuable suggestions and guidance are provided with respect to the operational application of C.E. Van Wagner’s (1977) theory to calculate the threshold conditions for the start and spread of crown fires in conifer forests. Variables discussed include the fire crowning category (passive, active and independent) and crown fuel properties (live crown base height, foliar moisture content, and bulk density) and fire behavior characteristics (spread rate and surface intensity).*


A concise summary of the key "take home" messages regarding the understanding of fire behavior to effectively manage forest fuels as it pertains to reducing the severity and subsequent impact of future wildfire occurrences.


The authors argue the need for and value of wildfire behavior case studies and the need for documentation of wildfire behavior by suppression staff. Some values or uses briefly discussed include:
training, research data, fire behavior predictions, appraisal of fire potential, testing of models, preparedness and safety.


The author reiterates (Countryman 1974) conclusions that no radically new concept of suppression can be anticipated and what is needed now is a comprehensive action plan that will effectively bring this technology to bear on the one factor controlling fire behavior that can successfully be managed and manipulated – the fuel.


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This document synthesizes the scientific knowledge relevant to planning fuel treatment projects to manage forest structure and reduce fire hazard in the dry forests of the Western United States. It provides basic quantitative and qualitative guidelines to modify stand density, canopy base height, canopy density and surface-fuel loadings when prescribed burning, thinning, or employing manual or mechanical treatments. The authors recognize the need to modify stand conditions in the context of landscape fuel conditions. It promotes the interim principles of (1) reducing surface fuels, (2) increasing canopy base heights, (3) reducing canopy density and (4) retaining larger trees until more empirical data on the effectiveness of fuel treatments in reducing fire behavior and fire effects in large fires becomes available.


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equipment to collect and bale the material exceeds $8 billion in 2010 and $32 billion dollars in 2020. New demands for biomass storage will exceed 4.5 and 14.9 billion cubic ft, generating more than $3.1 and $10.6 billion storage structures in 2010 and 2020, respectively.”


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