

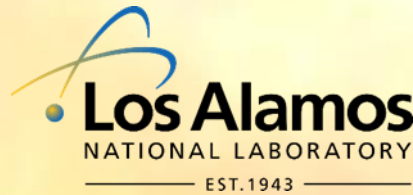
# Prescribed Fire Science:

## *Science for the Fires We Use*



**J. Morgan Varner, J. Kevin Hiers & many**  
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University of Idaho



FORUM

Open Access

# Prescribed fire science: the case for a refined research agenda



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<https://fireecology.springeropen.com/articles/10.1186/s42408-020-0070-8>



WPI



UNIVERSITY OF  
GEORGIA



# Wildland Fires

## Wildfires

*US: 7-14 million acres each year*

## Prescribed fires

*US: 10-14 million acres each year*



# Wildland Fire Science

## Wildfires

## Prescribed fires



3:1 wildfire: Rx funding



Over 13 yrs: 50 % more

International Journal of  
**WILDLAND FIRE**

Over 14 yrs: 3:1

## **Prescribed Fire Science-**

**Tremendous interest in maintaining  
and increasing pace and scale.**

**Need for decision support.**

**Opportunities...**

# Wildfire and Rx fire science are *different*

## Differ in focus:

- ❖ Fire behavior
- ❖ Fuels
- ❖ Fire weather
- ❖ Fire effects
- ❖ Social, political, and legal environment
- ❖ Costs and economics
- ❖ Operational challenges



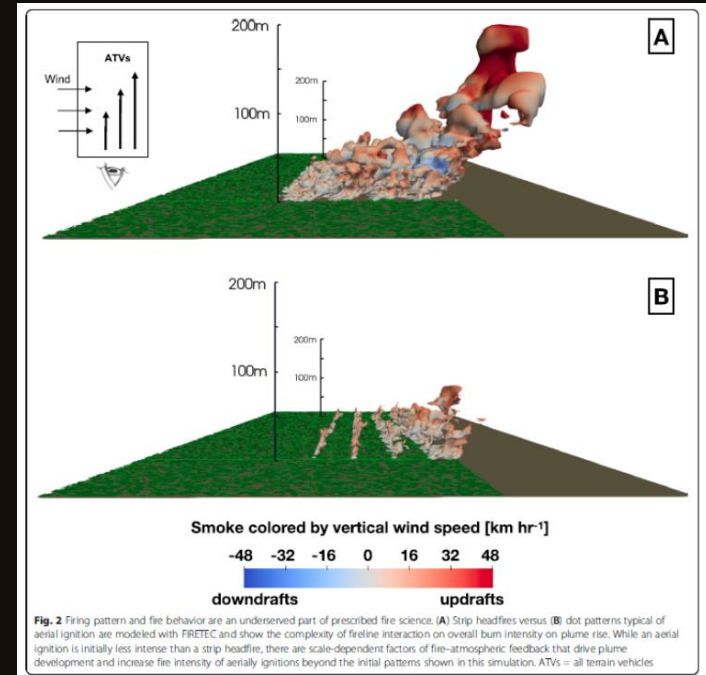
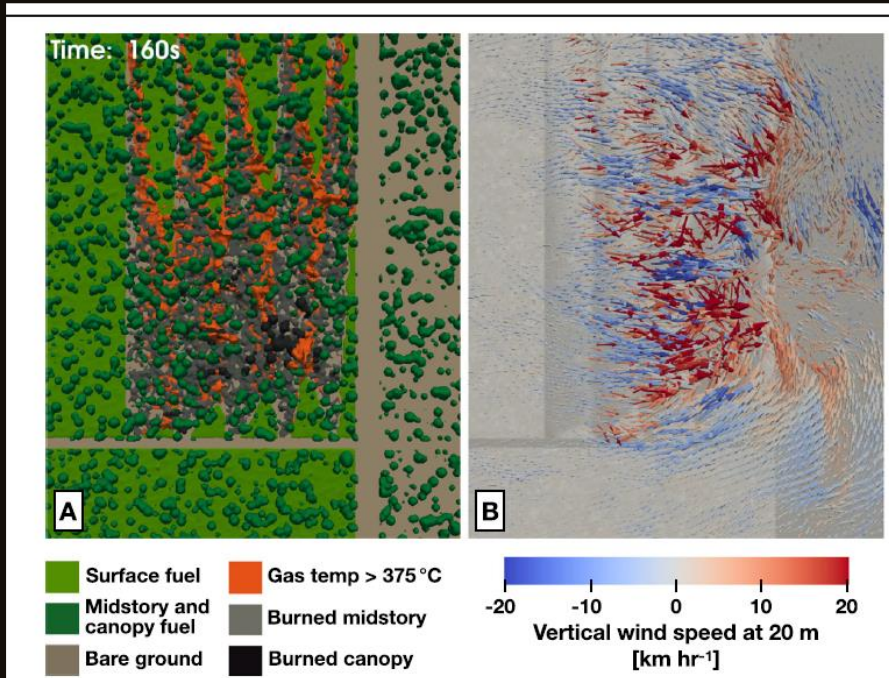
# Fire behavior

## Fire behavior differences:

- Ignitions intentional
- Fireline interaction dominant
- **Backing fire** important
- Diurnal primary
- Intensity > spread rate
- Concept of marginal fire



# Importance of Rx fire behavior



Hiers *et al.* 2020 *Fire Ecology*

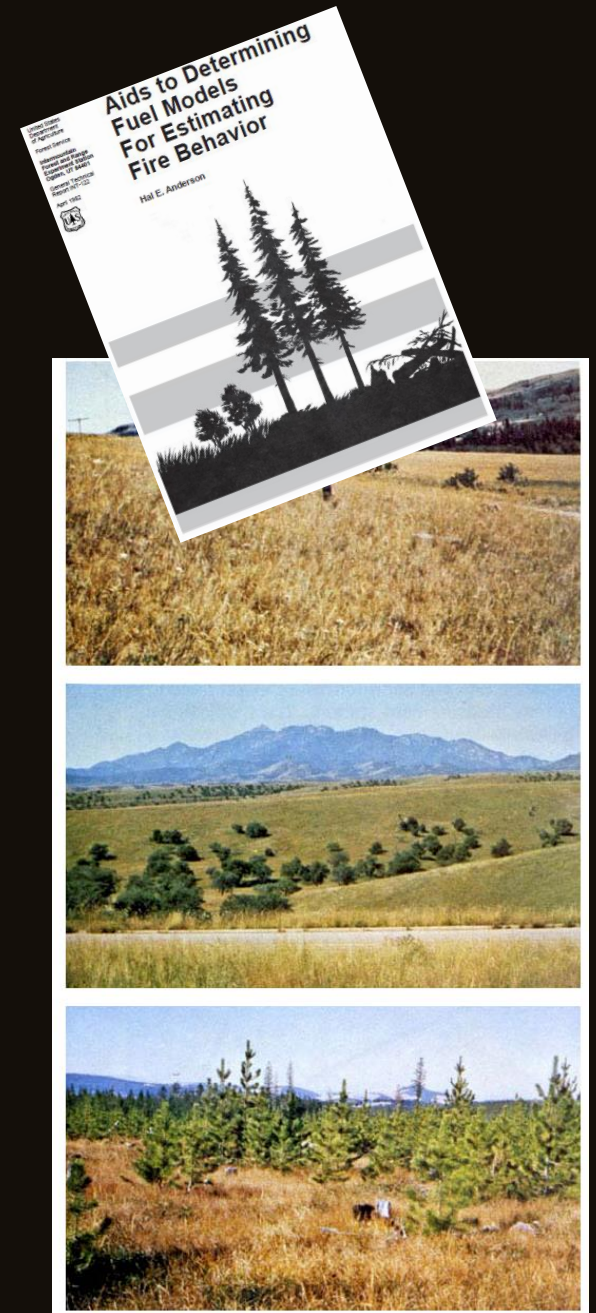
- Escapes & Spotting
- Firefighter safety



# Fuels

## Fuels differences:

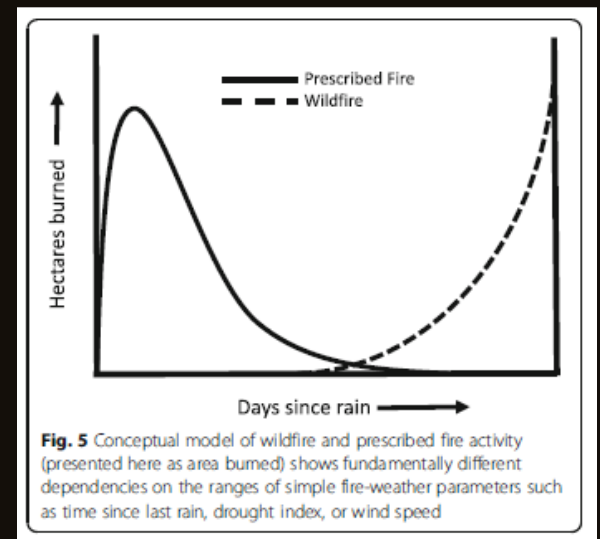
- Potential emissions
- Moisture dynamics
- Regionally prioritized
- ***Fine spatial and temporal scale***
  - ***3-D and 4-D***



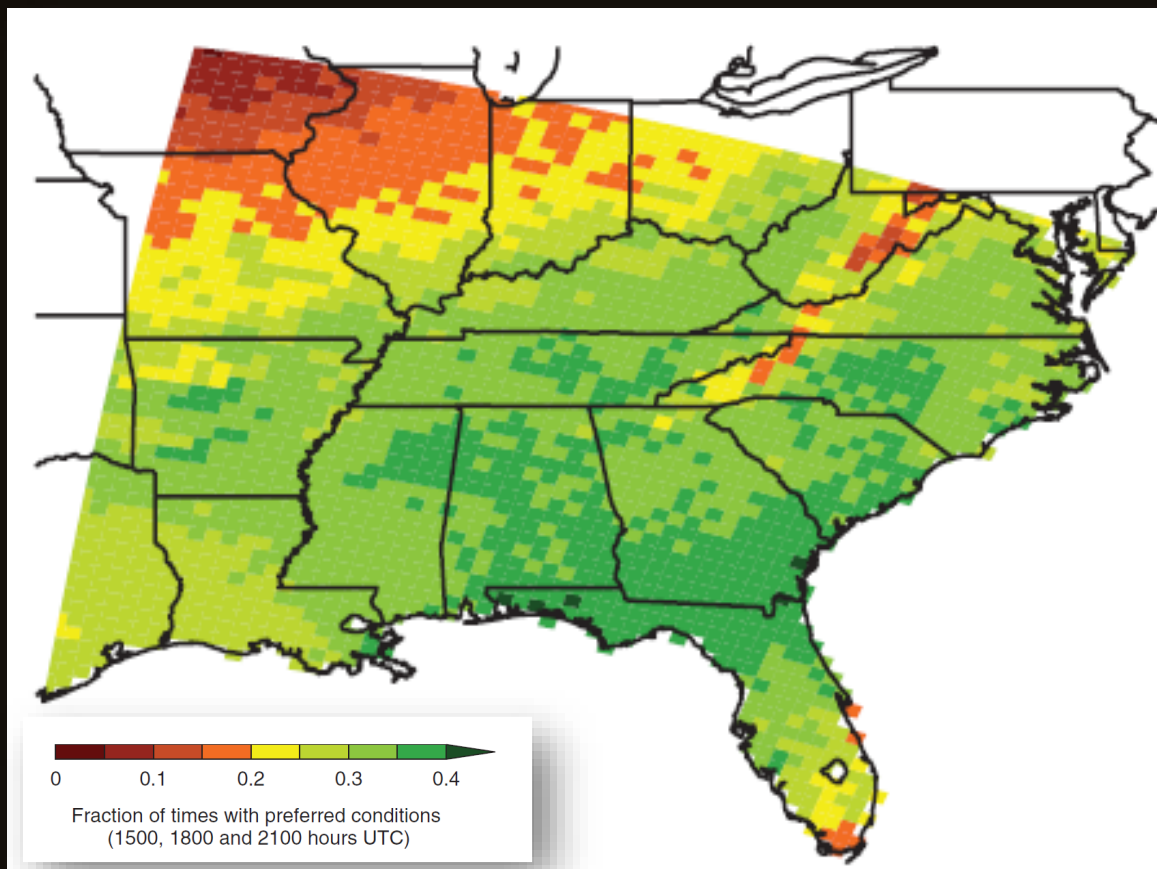
# Fire Weather

## Rx Fire Meteorology

- Fine scale issues
- Ignition sources
- Marginal v. Extreme fires
- Climate data v. weather data and observations
- ***Deep manager understanding***



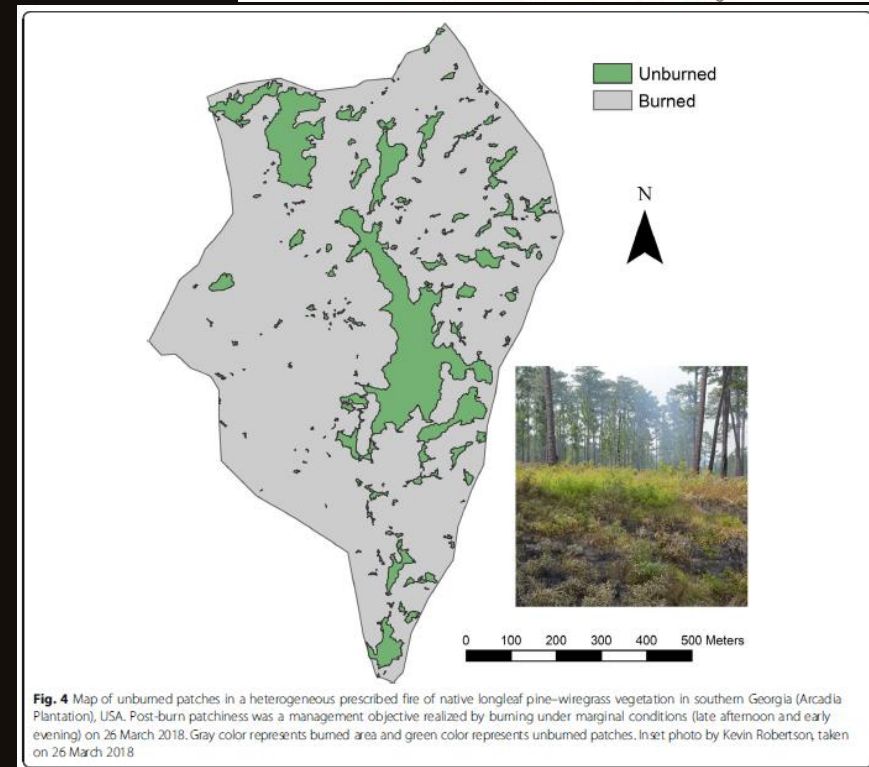
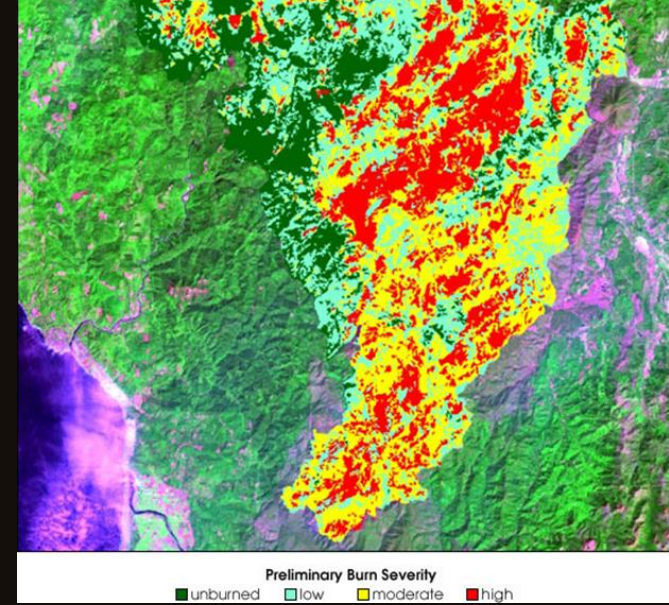
# Rx Fire Weather



# Fire effects

## Rx Fire Effects

- A *primary objective*, not a consequence
- Marginal v. Extreme fires
- Patchiness
- ***Scales differ***
- Variation prescribed in season, weather, size, location, frequency, shape, etc...





# This variation matters...



Kreye et al. 2017 *Forest Science*

# Social, political, legal environment

## Stark differences:

- **Acts-of-God v. Asking permission**
  - Favorability vs. Responses
- Private v. Public
- Regional and cultural
- **State** laws dominate
- Communication
- Communities of Practice



# Fire Operations

Scale differs:

- **Economics**
- Operational impediments
- **Decision support tools**
- Planning vs. response





# Research & Collaboration Needs

## Major Research Topics:

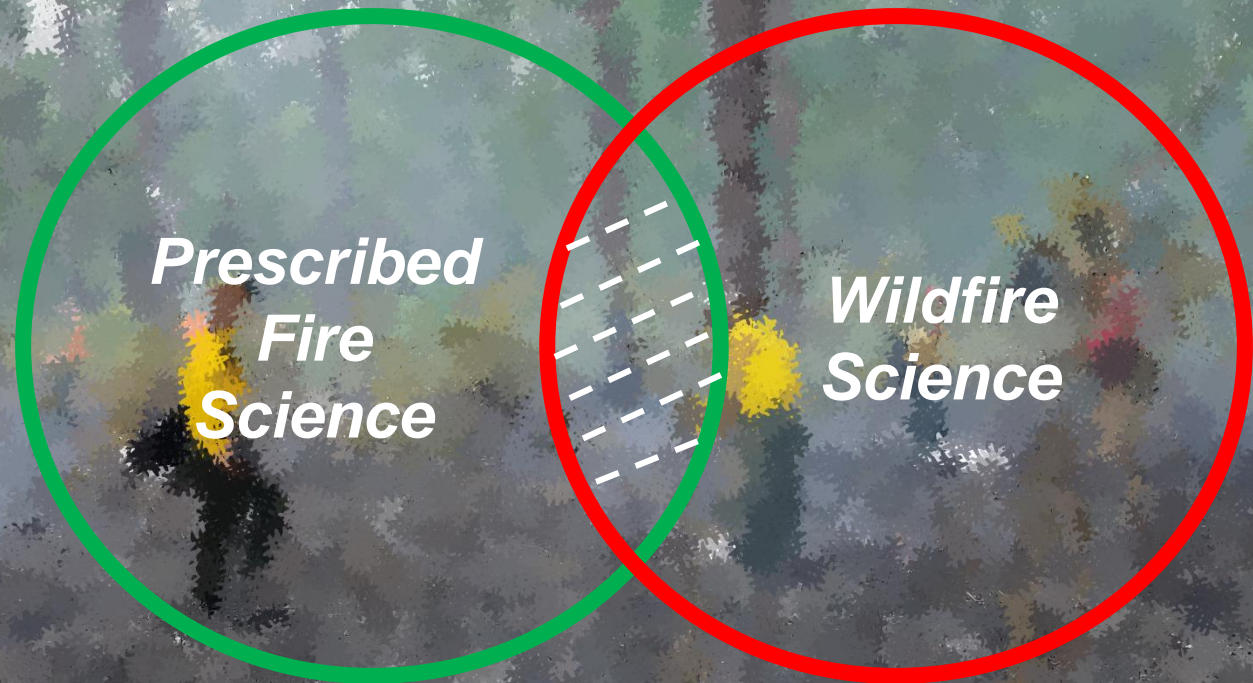
- Interaction of firelines
- Marginal fire behavior
- Smoke and its management
- Relevant scales for fire effects
- Scales of dependence between fuels & fire behavior
- How do we overcome impediments?



Rx Fire Science Consortium, April 2017



# Major Opportunities



**Rx Fire Science “made for” Coproduction of Actionable Science**





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**& many others in Rx Fire Science Consortium**